MARCH 1968 60c 7/-

AMERICAN AIRCRAFT modeler

RC SCALE: BUILD THE SPERRY MESSENGER

PAGE 16

THE SMITHSONIAN'S INCREDIBLE MODELS

PAGE 20

FOKKER TRIPLANE ILLUSTRATION BY BJORN KARLSTROM

RETAILER: SEE PAGE 72 FOR SPECIAL DISPLAY ALLOWANCE OFFER

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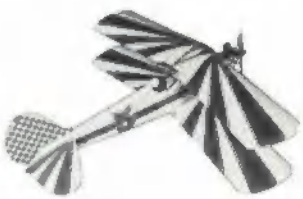

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AMERICAN AIRCRAFT modeler

VOLUME 66, NUMBER 3 **MARCH 1968**

COVER PHOTO: Bjorn Karlstrom's scale painting of the German Fokker Dr.1 triplane of World War I depicts an authentic color scheme for the maneuverable fighter.

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STRAIGHT AND LEVEL

Model aviation could lose the best friend it ever had, if the Navy drops the Nats in 1969. Here's the situation . . . .

WILL 1968 be the last of the Navy-hosted Nationals? Both the Academy of Model Aeronautics and the Hobby Industry Assoc. of America are on notice that, unless certain conditions are met in 1968 — or at least, that significant progress be made toward essential objectives — Navy may drop out of the picture in 1969. Simply stated, Navy's objections are a prohibitive expense in manpower and dollars, as well as failure on our part to fulfill the original Navy objectives (of 1948) in hosting the National Model Airplane Championships.

It was exactly 20 years ago that Navy hosted their first Nationals — like 1968, also in Olathe, Kansas. Their objectives at that time were: a) To encourage the interest of nation's youth and, more specifically, the aircraft model enthusiast in the U. S. Navy and thereby further, on a long-range basis, public understanding of the national security; b) To encourage active participation by naval personnel in the model aircraft program.

To these objectives have been added two more current requirements in keeping with changing times: a) To directly and indirectly strengthen the recruiting program; b) To enhance the Navy public image in areas of internal relations, community relations, and public information.

These current Navy objectives are being met, although great improvement is possible — and, we may assume, more or less imperative. This, it is admitted, is a Navy problem. Navy we presume will, of its own accord, sharpen its aims this year in this area. However, the original objectives have broken down.

"The participation of young people in the National Model Airplane Championships has steadily declined. . . . During the 1967 meet . . . the average age of contestants was 32 years," states Navy. Incidentally, AMA is desperately, and hard, at work on a youth tie-in for Olathe '68. This program is being built on the sensational success of the AMA Delta Dart (see Delta Dart: The Plane That Fooled the Experts, April, '67). If successful, and we believe it will be, this demonstration is expected to hold the line for follow-on developments essential to hold momentum during the 1969 Nats. Navy would like HIAA to help carry the load in 1969.

How satisfied Navy will prove to be in the future depends upon the degree of progress, as related to overall costs. Navy must cut out the fat. There is an expensive "war" going on. Manpower costs, in training in this case, are at least as important as the cost in dollars. And with huge National budgets and deficits these days, the significant costs to Navy inevitably are critically scrutinized.

What does it take to put on a Nationals? It costs Navy $150,000, of which $100,000 can be ascribed to such positive results as attracting people to Navy, and $50,000 for preparation, logistics, promotion, etc. Readiness training of selected air reservists at the host Naval Air Station is disrupted. This utilization of facilities and personnel is required during the week of the meet — in some cases preceding the meet for several weeks.

Disruption of all normal routine affects administration at the NAS. Large numbers of enlisted personnel must be utilized to increase fire watches, mess cook duties, and police the station. The effect of this type of assignment upon morale and retention is undesirable. In plain English, a lot of chaps who are removed from our civilian life, wonder what our Nationals is all about.

Training schedules are disrupted due to the loss of availability of hangar spaces and adjacent area during preparation for the meet, and the meet itself. Certain flights are not available, unless aircraft and personnel are pre-positioned at another, nearby military facility. There is a reduced aircraft availability for a week following the meet and there is a reduction in flight time.

Obviously, all these problems are related to the length and the size of the meet. Does the meet have to be so big and complex; does it have to take so many days? Forgetting the constantly rising age levels of contestants, the problem of size is not new at all. Indications were given by Navy as long ago as 1961 that revisions would be wise. AMA Headquarters, through the regimes of two Executive Directors, has been sensitive to the need for corrective measures. An innocent bystander may wonder why action has not been forthcoming. The modelers resist any suggestions that *their* event might be abandoned for Nats competition.

AMA Headquarters does not dictate. It can't under its democratically constituted organization. So events remain that have virtually no connection with the everyday activities of the hobby. Extinct forms of models are sacrosanct. Nevertheless, some progress has been made in reducing the number of Nats events, and the number of days required for the Nats. Sterner measures must be expected. The same selfish thinking that has strangled junior participation competition by "pricing out of the market" suitable events, held us on a near collision course with disaster. In affect, the democratic machinery of AMA, where every regional and section and local voice must be listened to, has created what could be the world's largest committee. One is reminded of the old saying which states that a camel is a horse created by a committee.

And what is the cost to AMA? It takes 150 people to run Nats events, 75 Navy, and 75 AMAers. Total AMA costs are $25,000, including things that must be bought,

Continued on page 68

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A.M. REVIEWS

STANLEY M. ULANOFF

Junkers Ju-88 and **The Jew with the Blue Max**, both by Heinz Joachim Nowarra, 32 pgs., $1.95. Aeronautica John W. Caler, 7506 Clybourn, Sun Valley, Calif. 91352.

These are the first two booklets in the new Caler Illustrated series.

Junkers Ju-88 features the Type A-5 and A-4 models. The German air historian, Nowarra, was a group leader at the Junkers factory during World War II. The booklet contains many photos of the aircraft that were especially selected to be of value to scale model builders. The centerspread color illustration will also be appreciated by modelers.

The Jew with the Blue Max is the result of extensive research by Nowarra. It seems that Hitler had made every effort to erase any evidence that Ace Wilhelm Frankl had ever existed let alone been a hero. Here for the first time, is the story of the Jewish German fighter pilot who won Germany's highest air award in World War I and the man who, after Boelcke's fatal crash on October 28, 1916, was the top ace of the German fighter-pilots in total victory scores. Mention is also made of other Jewish fighter pilots in the kaiser's air force.

Forthcoming additions to the Caler Illustrated series, now in preparation, include: The Ju-87; the Battle of Britain; the Spanish Civil War; U.S. Navy WW II markings; Galland and his Aircraft; the Luftwaffe over Poland; the Art Chester Story; and others. All of these booklets, the publisher adds, will be lavishly illustrated, many with color, and will be of special appeal to modelers.

Aero Modeller Annual 1967-68, 128 pgs., $1.26. Model Aeronautical Press, Ltd., 13/35 Bridge St., Hemel Hempstead, Herts, Eng.

Printed on the best of paper with a hard-cover, this world-famous annual follows the publisher's well-proved approach of mixing a variety of well illustrated articles with numerous astutely selected three-views of outstanding and unique models from many lands. Typical articles include: Updating the State of the Art of Speed Flying, Props and Power, Flexwing Flying Models, Tuned Exhaust Pipes, Woodwork and Model Making, Japanese World War II Color Schemes, Control Line Fuel Tanks, and many others. Three-views depict practically every kind of design, including contest-types in various categories, scale, and a wild and wonderful variety of copters, magnet steered gliders, and other beasties. No modeler can be without this valuable reference. This annual is a reading — and looking — experience.

Radio Control Manual No. 2, 128 pgs., $1.62. Model Aeronautical Press, Ltd., 13/35 Bridge St., Hemel Hempstead, Herts, Eng.

Following the same basic format and specifications as the **Aero Modeller Annual,** this work contains ten excellent features and 15 plans of such well-known craft as the Sky Squire, Spreng's Thunderstormer and the Ladyfinger. The selection of types covers everything from single-channel, through Galloping Ghost, to Class III and Goodyear. Reprinted from AMERICAN AIRCRAFT MODELER are the Windmill, a competition Class 1, and Howard McEntee's popular Leastie Beastie. Articles include Control Surface Design, Engine Developments, Water Planes, Goodyear, Foam Core Wings, Simple Proportional, etc. Numerous pictures, charts, and well-executed diagrams.

All radio control fans will enjoy this fascinating work. The beginner will find his horizons considerably expanded. For tyro or expert, this book is highly recommended.

The War in the Air, by Trevor Nevitt Dupuy, Col. U.S. Army, Ret., 98 pgs., $2.95. Franklin Watts, Inc., 595 Lexington Ave., New York, N.Y. Volume 11 in a series of 12, **The Military History of World War I.**

Colonel Dupuy surveys the new kind of warfare that was waged between the Allies and the Central Powers. The airplane played an increasingly important role as the war progressed. The flimsy, crude aircraft of 1914 developed into the fast sturdy planes and bombers of 1918. Allied planes were put to use in battle against the giant German zeppelins which had bombed both Paris and London.

Most outstanding in World War I air warfare was the emergence of the new kind of hero, the fighter pilot, the pilot ace. Here we find them from Germany: Baron Manfred von Richthofen, Max Immelman and Oswald Boelcke; from France, Roland Garros, Charles Nungesser and René Fonck; from England: Albert Ball and Edward Mannock; from Canada: "Billy" Bishop; and from America: Captain "Eddie" Rickenbacker and Frank Luke. Here we find also the exploits of the famous Lafayette Escadrille and von Richthofen's "Flying Circus."

The major importance of the air war of 1914-18, according to Dupuy, was as a forecast of things to come, and as a proving ground for tactical and technical theory for future wars. That the nature of future

war could and would be utterly changed by air power was foreseen by three airmen in particular: Guilio Douhet of Italy, who advocated the destruction of cities by air bombardment; Sir Hugh Trenchard of England who recommended an air force as a completely independent military service comparable to the army and the navy; and American Billy Mitchell who developed and demonstrated the effectiveness of the concept of massed air support for attacking ground forces.

Aerospace Facts and Figures — 1967, 140 pgs. $3. Compiled by the Public Relations Service of the Aerospace Industries Assoc. of America; published by Aero Publishers, Inc., 329 Aviation Rd., Fallbrook, Calif. 92028.

This is the 15th annual edition summarizing the accomplishments during the previous year. The aerospace industry is the largest manufacturing employer in the United States — one out of every 15 employees in manfacturing is employed by this industry. Sales in 1966 were a record $24.2 billion; exports rose to a record $1.5 billion; backlog of orders for major aerospace companies, which indicate the level of future sales, rose to $27.8 billion at the end of 1966; aircraft products is estimated at 4000 military aircraft and 16,103 commercial transports, helicopters and general aircraft.

The details and other statistics are found in this handy booklet. Sections are devoted to the 1966 statistics on missile and space programs, research and development, exports, manpower, finance and air transportation. Also included is a listing of names and addresses of the public relations officials of the manufacturing members of the Aerospace Industrial Assoc.

Kites: An Historical Survey, by Clive Hart, 196 pgs., $12.50. Frederick A. Praeger, 111 Fourth Ave., New York, N. Y. 10003.

As pointed out in the foreword by Charles H. Gibbs-Smith, the noted aeronautical historian, an authoritative history of the kite has never been written. He states that kites have not been given sufficient serious treatment they deserve as a branch of aviation — the kite being the prototype of the airplane wing, and may be regarded as a tethered glider. It is an excellent study of the principles of aerodynamics and the theory of flight.

Clive Hart surveys 2500 years of the kite's history. He starts with its origin in China, the first types used there, then proceeds to the other eastern lands — Japan, Korea, Malaya, Indonesia and Thailand. After the first three chapters which are devoted to the bizarre and colorful oriental kites, the author takes up the development of the technologically more important, if less attractive, western kites. The survey takes us up to the present time. Although powered flight has relegated the kite to more recreational uses, great strides continue to be made with kites. An example is the "Flexi-Kite" developed by Francis Rogallo of NASA. This flexible-wing kite, although first used as a toy, was recently accepted by two American aircraft companies for potential application as gliders and dirigible parachutes, and as the basis of a new manned vehicle. This led soon afterward to the development of the "Fleep," a flying jeep which can work from short, rough landing surfaces and will lift loads of close to half a ton.

Kites is profusely illustrated with interesting plates both in monochrome and color. The aviation fan, particularly the modeler, will find this book both extremely informative and absorbing.

An Industry View

Just received the January, 1968 issue of AMERICAN AIRCRAFT MODELER and I couldn't put it down before I dashed off this note to congratulate you on the changes. The entire appearance and layout of the publication is just fine, the editorial features and content are quite timely; and the slick paper merits my great enthusiasm. Again, congratulations on the changes. I know that your publication and our company will continue to support the sport, industry, and ourselves mutually for many, many years to come.

Ed Manulkin, Sterling Models

Roland Garros Flies Again!

A reader stated in the January issue of AMERICAN AIRCRAFT MODELER that Roland Garros never shot his propeller off with his famous machine gun. Garros maintained in 1915 that, by the law of averages, it was impossible to eliminate one's airscrew with an unsynchronized MG. Garros must have miscalculated, however, and on a ground test the propeller was shattered by a short burst. After installing the famed prop wedges, R. G. was forced down several times for various reasons — props splintered by the impact of the bullets, shattered prop wedges, etc. He was almost killed in an in-flight test because of a combination of these problems. Specially designed wedges, reinforced prop, and soft-nosed bullets constituted Roland's final product.

P. Hughes, Bloomington, Ill.

Him We Like!

Congratulations on the January 1968 issue of AMERICAN AIRCRAFT MODELER. It is all you promised. I have been building model airplanes since 1933 and have seen "new" model aviation magazines come and go — I do hope your magazine stays. It covers well all phases without specializing; please keep it that way. Paul Matt's January article on the Aeronca Champion is excellent. With drawings on pages 28 and 29 and a bag of Sig balsa, an old-time solid model is possible. Sure hope you plan to include similar articles in the future. Your coverage on radio control is understandable. It should cause Brand-X magazine to review their material (and improve it). My first interest is free flight and I am anticipating continued good coverage. While I am not active in competition, I attend contests to watch, time or help so as to get a close-up look at the models. Good luck with your new magazine.

R. Lonseth, address not given

This "new" magazine is almost 40 years old. Ed.

Only Two RCers

I am getting started in RC and have enjoyed your magazine very much. There are only two of us RCers here in town and we have been having nothing but bad luck. Was very glad to see your article on

"Getting Started in RC." Sure wish we would of had that information when we started. We had to start cheap, but we started too cheap I guess. We started using super-regen receivers and that's been part or most of our problems.

W. D. Power, Phillipsburg, Kan.

Charlie is a Problem

Being in Vietnam since January 1967, I've been fortunate enough to see only [illegible] copy of your great publication. Please send me a subscription blank. Seems [illegible] be a shortage of newsstands out here. Although we do have a few fairly well supplied hobby shops, the chances of loss of free-flight or RC models are too great [illegible] risk the investment. Also, I [illegible] wouldn't want to chase one. Whoever heard of flying Class II with a flak jacket and M-16? Well, there's always hand-launched gliders. I've a lot of building to catch up on when I get home. Also suggest the "Check List" look into the RC scale and standard models put out by M. Kato. Outstanding craftsmanship.

E. L. Kleme 284-270 BMC,
FPO San Francisco, Calif.

What To Do?

I have just started this hobby and would appreciate any literature you could send me. Thank you.

J. Susskind, Plainview, N. Y.

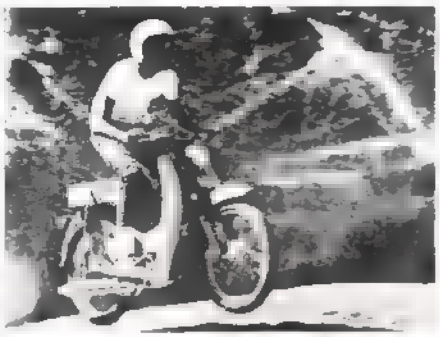
This magazine receives many letters like this one. Unfortunately, the model airplane field is oddly lacking [illegible] integrated instructional material. A chap can write advertisers for their catalogs. There are [illegible] few books — which are, at best, [illegible] partial answer. But after that, what? And the same problem exists in radio control. Ed.

Twilight Zone?

The enclosed photograph [illegible] into my hands in a rather unusual manner. Seems as though my seven-year-old son found a roll of negatives in the street [illegible] the way home from school. "Hey dad, this has got airplanes on it!" Sure enough, had them printed up, and this is what we had, along

with several other nice shots! Since we live right near the Lockheed airport, it may not be too strange that a few pictures would turn up, but from the 1930's? Twilight [illegible] stuff. My next-door neighbor, who works at Lockheed, took them [illegible] work, and everybody flipped! All were amazed.

B. Hannan, North Hollywood, Calif.



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HOW TO ENTER. It's easy. Just send us the end panel (or reasonable facsimile) from any Revell model kit, with your [redacted] and address on back. Send in as many entries as you like, but they must be postmarked by May 15, 1968. Do it now. (If you choose the end panel from one of Revell's 14-newest model kits, you'll find a bonus inside: Free Gift Stamps.)

Revell

REVELL, INC., 4224 Glencoe Ave., Venice, Calif. All entries become the property of Revell, Inc. and none can be returned or acknowledged. Judges' decision final. Contest subject to local, state and Federal laws, and void where prohibited. Revell employees, employees of Revell distributors, dealers or their immediate families are ineligible.

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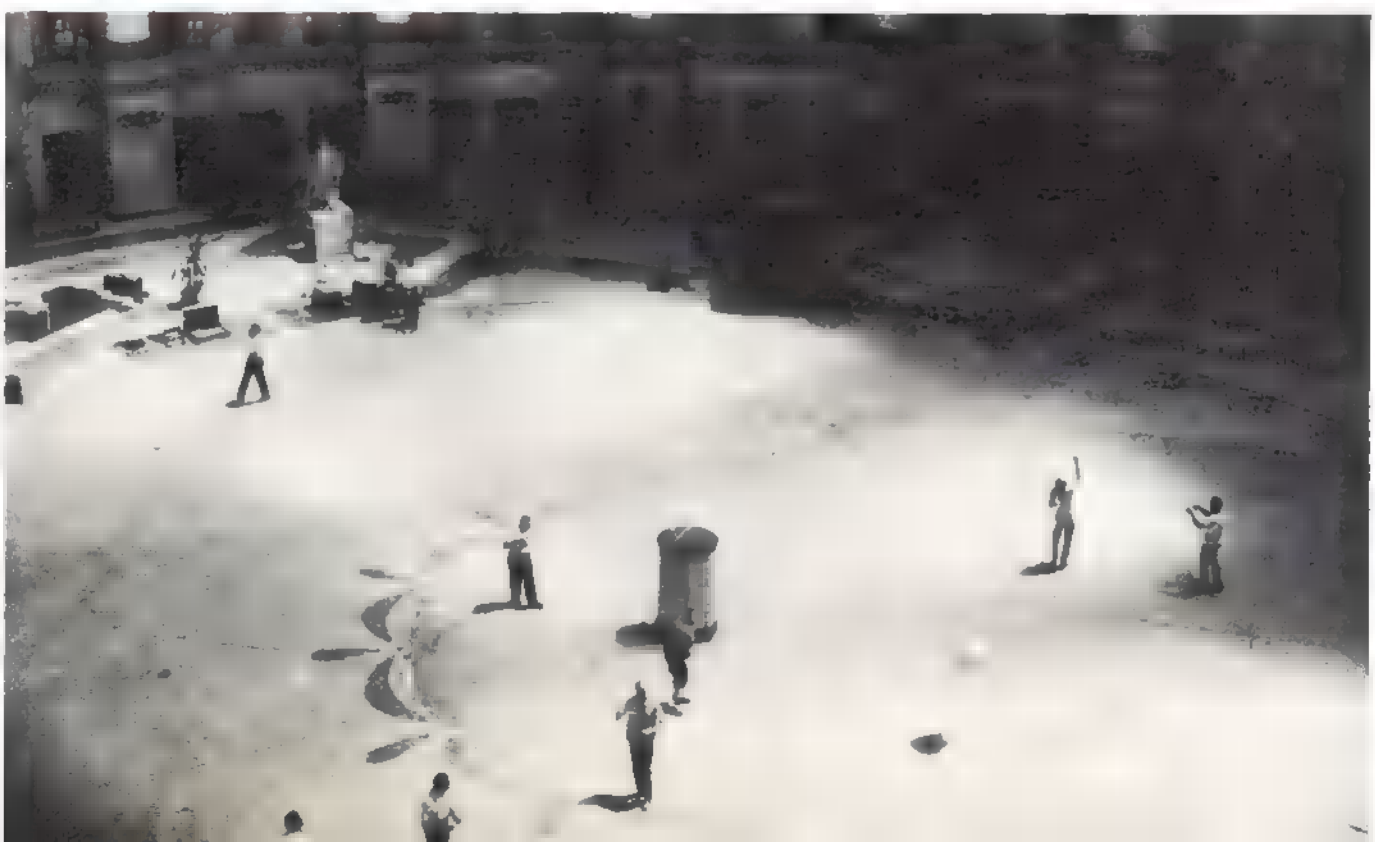
...on the international scene

Young rocketeers demonstrate for space scientists

Model rocketeers were honored by space scientists during special ceremonies last October on the tenth anniversary of Sputnik. Five young members of the National Association of Rocketry were special guests, cited as representing "the wave of the future . . . in space research." Greg Scinto, 15, of Stamford, Conn., is shown discussing model rockets with H. E. Paige, Vice-President of the General Electric Company's Missile and Space Division. Jim Kukowski supervises demonstration at G.E. host site, Valley Forge, Pa.

U. S. Finals site shows new trend for Indoor meets

The 1968 U. S. Indoor [illegible] was selected last August at a flyoff in the Pompeian Court of Northwood Institute in West Baden, Ind. The court is similar to the Palace de Sport in Rome, Italy, where the world championships will be held this year — almost 100 feet high and over [illegible] feet in diameter. Indoor meets of old, usually held in big military hangars, suffer in comparison: contestants slept in rooms looking out over the site. AMA's CD, Chuck Borneman, marveled: "Imagine waking up and watching a mike job go serenely past your window!"



model world
...on the international scene

SVAZARM provides government support for Czech modelers

Model flying in Czechoslovakia includes facilities and support for [illegible] clubs, provided by SVAZARM, a government organization that runs such activities [illegible] gliding, swimming, shooting, sailing, parachuting, flying and athletics, as well as other branches of modeling such as slot racing and rocketry.

To a Westerner the support given to model flying seems unbelievable. At the recent World Free Flight Championships at Sazena, the government supplied three helicopters for model recovery, and the contest obtained for five consecutive days an average of [illegible] out of the 140 column inches of the sports page of **Rude Pravo**, the country's only daily newspaper. Even at small contests the local party first secretary, the equivalent of a mayor, will present the trophies, and the results will appear in the paper alongside the football and other sports results. Can you visualize that in this country?

Martin Dilly

Lawrence Hoffman

Single Channel RC in the land of the rising sun

The 2nd All-Japan Club RC Contest, Single Class, was held at the Marashino Air Self-Defense Forces Parachute Training area. Eight clubs were entered, five men to a [illegible]. Due to extremely heavy wind conditions flying time was increased to seven minutes from the five normally allowed. The spot landing area was altered to include the 50-meter circle for top points, and anywhere in the immediate area [illegible] the next lowest score. Highlights of the contest were the splendid flying of the individual high scorers. On the right you see Mr. Y. Kimura, age 14, from Tokyo, urging his bird along with a little hip "body-English." Mr. Mimura was highest individual scorer and flew the Hope Star, low wing, ailerons only, with an Enya .19 engine and Hinode single proportional radio. On the left [illegible] the winning team, the Kobayashi RC Club, winners of last year's single class contest. From left to right: Y. Kimura, holding the Hope Star described; Mr. T. Kobayshi, designer of the Hope Star and several other fine flying planes. Mr. Kobayashi flew his biplane, the Silver Star, but is shown holding his yet-to-be-released "Glory." Next in line is the younger Toma with his home-grown creation in front of him. His older brother is just behind and on the extreme right is the team captain, Mr. Y. Ota. Mr. Ota flew the Victory C, another Kobayashi bird; shoulder wing with ailerons and coupled rudder.

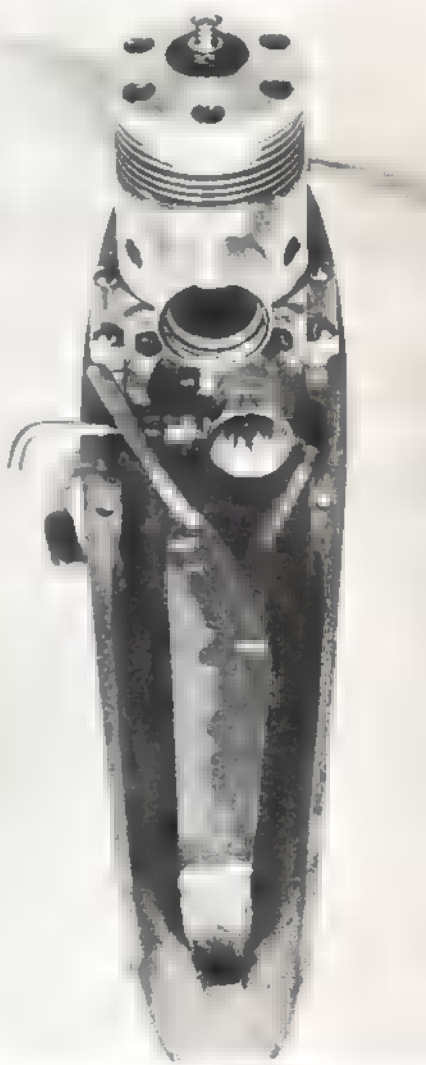
Officials meet to present historical model display

Dr. Walter Zaharevitz of National Aerospace Education Council, Pat March from Cincinnati, Ohio, Bob Sauter of Silver Spring, Md., and James H. Sage of Dallas, Texas, are shown listening ▬ Sauter points out working details of 1908 Farman Biplane made by Carlysle Linskie of Irving, Texas. The occasion was a special presentation held in Washington, D.C., under the joint auspices of the International Plastic Model Society and the National Guard Association of the United States. Presented ▬ a collection of historical Air National Guard aircraft produced by I.P.M.S. modelers. The collection was the result of a project initiated cooperatively by both groups to obtain replicas of all aircraft flown by the Air National Guard from 1908 to the present. Over sixty aircraft were modeled and contributed by I.P.M.S. members. A magnificent collection indeed!

Lawrence ▬

Tokyo-built Messerschmitt

Hand-rubbed to a high gloss, this silk and dope finished semi-scale WW II Messerschmitt is the result of much patience and unusual skill by its creator, Mr. Fujio Oka. Mr. Oka designed and built the plane from scale pictures for Mr. Keiji Ishikawa, President, Japan Steel Company, Tokyo. These gentlemen are members of the Tokyo Flyers Club, winners of the First All-Japan Team RC Multi Class contest last year. Vital specs ▬ Radio is Orbit, with fifth channel used for landing gear. Wing span is ▬ cm, fuselage is ▬ cm. Flying weight ▬ 4.7 kg (10.3 lbs.), Engine is Fox .74. Main gear tires are locally made by the MG Company. Model also has flashing wingtip and tail lights.



Dale Kirn

Closeup of a world champion

According to advertising on American television, "it's whats up front" that counts. Here is a close look at Theobald & Wisniewski's TWA 2.5 ▬ engine from the rear. This is the engine which Wisniewski used to win the FAI speed event for the U.S. at the 1966 control-line world championships in England. Note exhaust opening, air intake and the "suction" metal tank. Tuned exhaust pipe slips into exhaust opening after the pan and engine are attached to the plane. The 1966 tuned pipe performance started a revolution in international competition. European pipes dominated the Criterium of Aces control-line meet last year, and the 1967 free-flight world championships was won with a tuned exhaust engine from W. Germany.

Sperry Messenger

JESS KRIESER

Model flying characteristics depend on the power, size large and powerful control surfaces abound — four ailerons, monstrous rudder, and thick, big elevators. Highly maneuverable and yet quite stable.

THIS interesting little biplane is ideally suited for home-building. It's small, with a wingspan of only 20'. It had only 56.5 hp. And it featured simple, mostly wood construction that probably would not require special skills or special tools to complete. It is fully aerobatic, and was stressed to a load factor of six.

The fuselage was a simple box, made with square, wood longerons and uprights, with a few semi-circular formers on the turtledeck, and around the nose. The entire structure was covered with ¼" plywood. Tail surfaces were simple, wood frames, with steel tubing edges. Wing construction was mostly wood, with bandsawed ribs fitted with wide, slotted capstrips. Spars were wood, routed out for lightness. Tips were square, and the wire trailing edge pulled in to give a scalloped appearance when the dope tightened the fabric.

Aileron cables were in the lower wing. Ailerons on the upper wing were actuated by the lower ones through interconnecting struts. We've followed this set-up somewhat in our model, as the aileron servo is in the bottom wing for convenience, and wire pushrods connect the lower ailerons to the upper ones.

The only departures from true scale are the airfoil, wing trailing edge and construction. In every respect it is a realistic airplane.

Your first scale model? Why not — it has everything going for it! Structurally similar to original Messenger, a fine sport flyer.

Far left: The front-quarter view shows many important details for the scale modeler — the airfoil section, diagonal struts, and engine cowling.

Naturally, the instruments were manufactured by the Sperry Gyroscope Co. This is the cockpit (center left) of Lawrence Sperry's personal plane. Notice the hand-holds in the top wing and the windscreen shape.

Left: Designed to be a soldier's aerial motorcycle, the Messenger was small, nimble, and easily manufactured — 42 of them were built. ■ ▬ stressed for aerobatics because it had to be rugged for its mission.

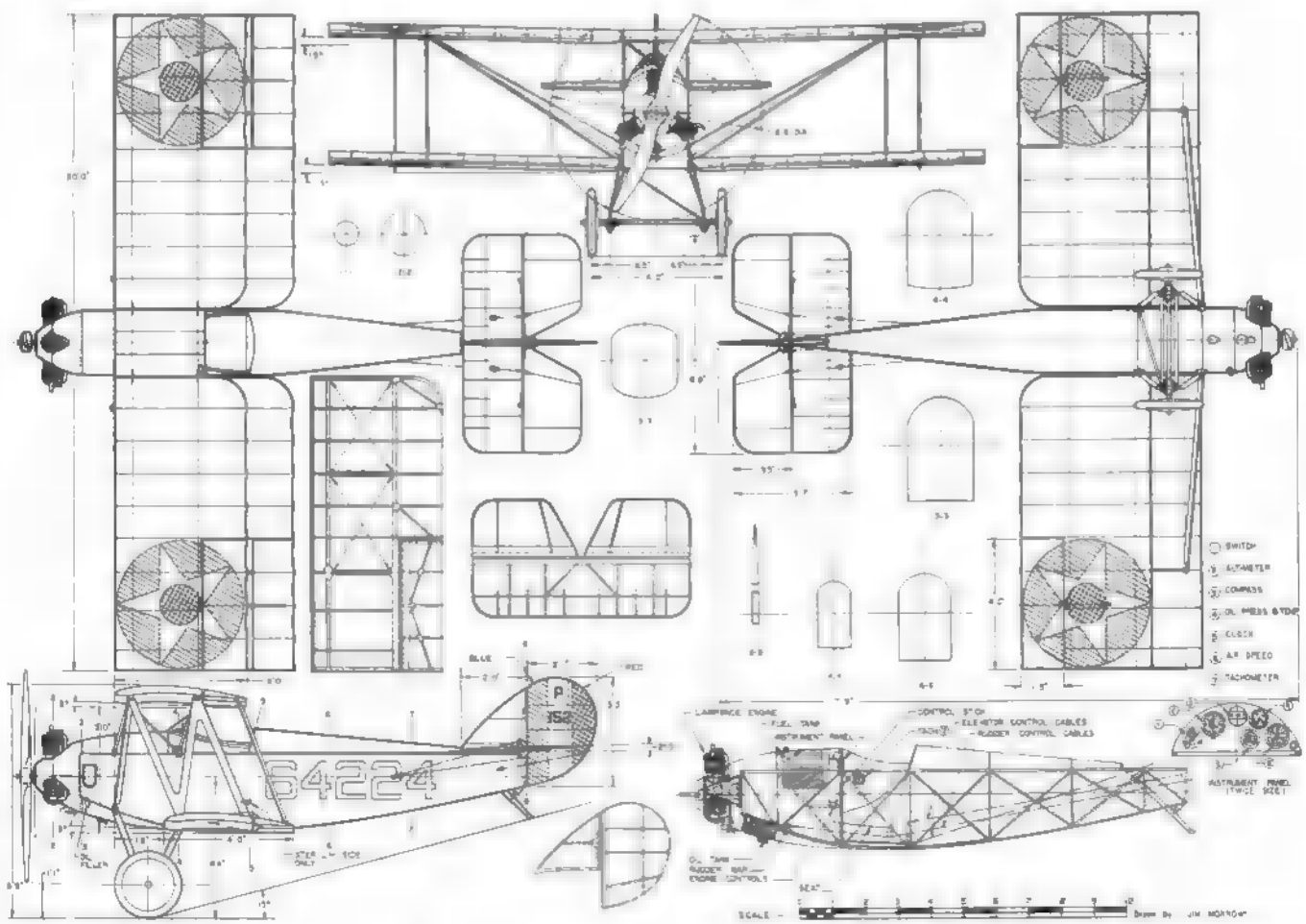
Three photos, from Smithsonian Institution.

From the early days, ■ delightful RC scale model capable of aerobatics. Recommended power is ■ .45 — a .60 for you hot-rocks!

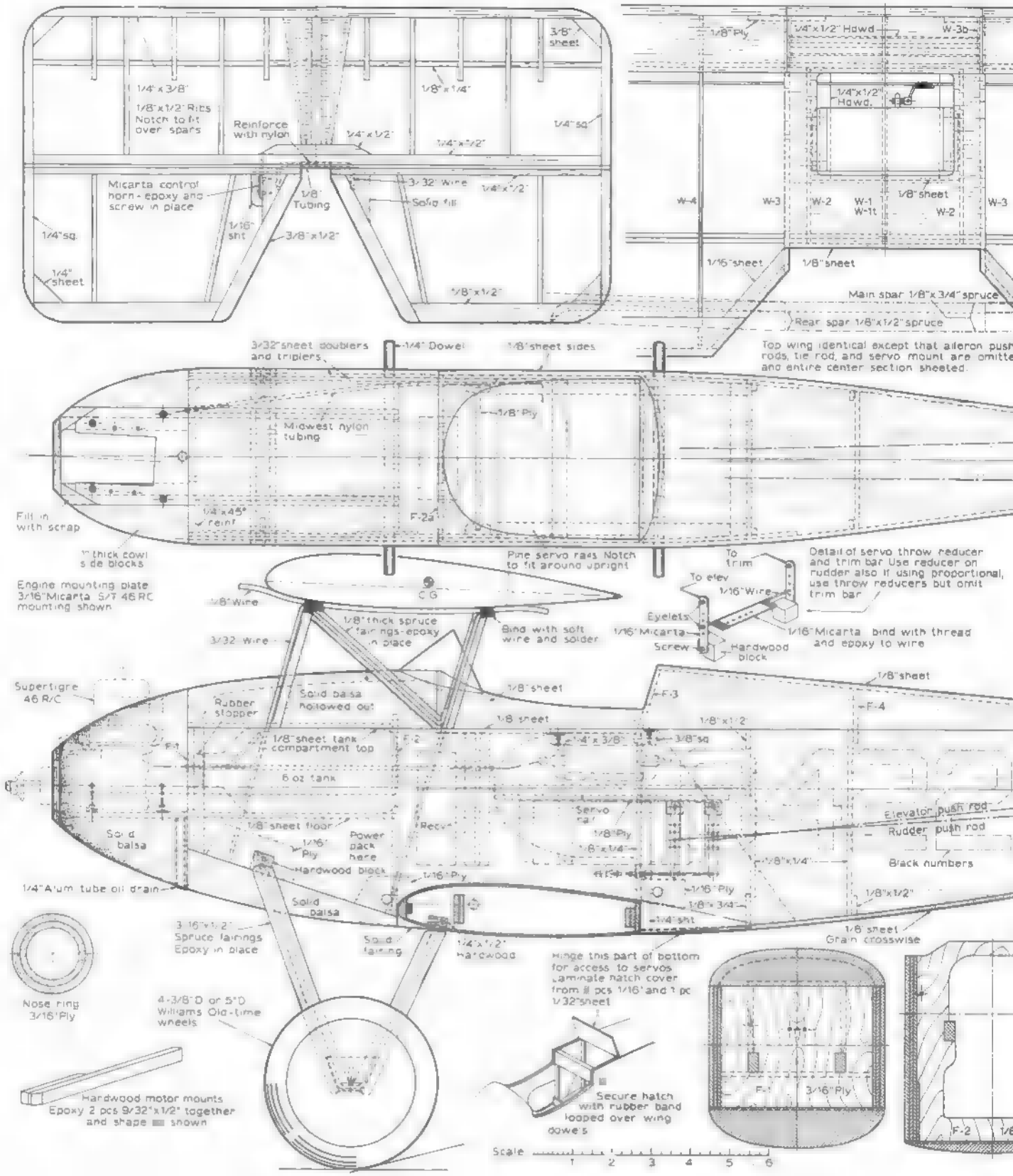
with Kwik-Links to provide final trim adjustments.

Although it bears the name of Lawrence Sperry, the Sperry Messenger was actually designed by Alfred Verville, of the U.S. Army Air Service Eng. Div., Dayton, Ohio. Its origin dates back to the three-year period following World War I. It was through the successful bidding of Lawrence Sperry that the Messenger acquired his name, as the initial contract to build the Messengers was granted to the Lawrence Sperry Aircraft Co., of Farmingdale, Long Island, in April of 1920. It was in a Messenger that Lawrence Sperry made his famous landing on the plaza in front of the Capitol Building in Washington, D.C., and climbed part way up the Capitol steps as his tail skid didn't bite into the concrete to arrest the ship on roll-out, and he had no wheel brakes.

A novel three-cylinder engine powered the Messenger. Of air-cooled radial design, and equipped with dual battery ignition, it turned out 56.5 hp at 1,600 rpm, and 64 hp at 1,880 rpm. This gave the diminutive biplane a top speed of 96.7 mph at sea level, with a minimum speed of 45 mph. With only 150 square feet



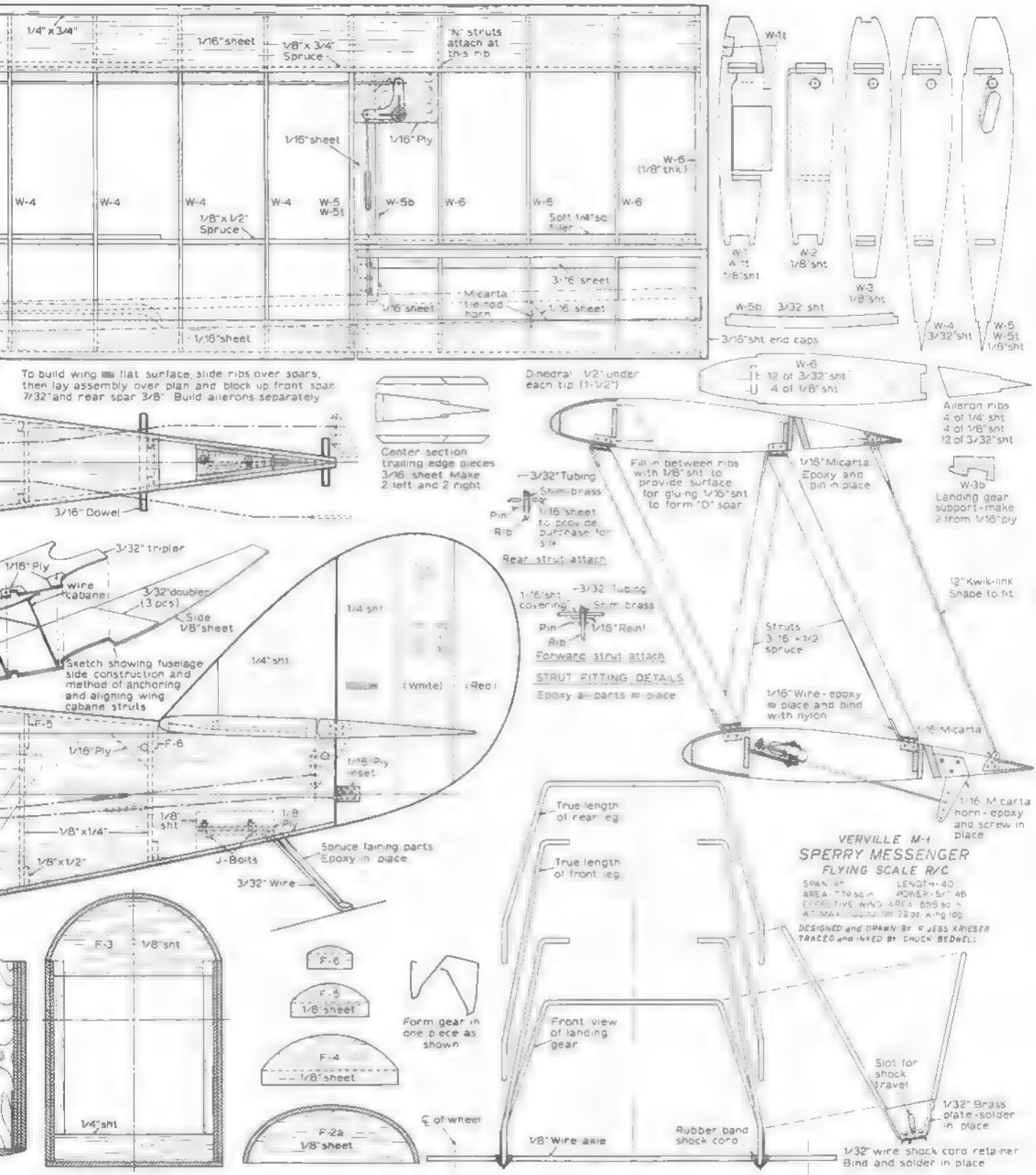
The scale drawings above were originally seen in AMERICAN MODELER 1962 and recently in AIR PROGRESS HOMEBUILT ANNUAL. A model could be built directly from them too.



of wing area, and a wing loading of only 5.7 lbs. per square foot, it climbed 700 feet per minute on this small amount of power.

When Verville first designed the Messenger, there was no official system for designating Army airplanes, so it simply was called the "Messenger," and given Sperry's name to designate the manufacturer. This label stuck. When the Army designating system was revised in May, 1924, it continued to be called the "Sperry Messenger." However, the official designation after that date was M-1 for the first 22 built, and M-1A for the remaining 20 ships. The ship was doped in the then-standard color of khaki-brown all over; with red, white, and blue stars on the wing; and red, white, and blue vertical bars on the rudder.

For those wanting more details and background on this aircraft, an excellent two-part article by Pete Bowers appeared in AMERICAN MODELER, in May and June,



1962. There have been absolutely no departures from scale except for our choice of a semisymmetrical airfoil, to improve performance, and omission of the scallops on the trailing edge of the wings. Even the landing gear is to scale, with working rubber shock cords. However, the Williams wheels are slightly out of scale on their diameter, and your wheels will either be slightly larger, or slightly smaller — depending on which of the two sizes you use.

Flying the Messenger will be a real ball; you can make this ship perform like a flying scale or like a hot competition

Continued on page 60

FULL SIZE PLANS AVAILABLE
SEE PAGE 60

The Consolidated NY-2 by Major Robert C. Mikesh USAF has fabric fuselage panels stitched "in-scale." Hood over the rear cockpit was used in blind flying instruction.

Eddie Rickenbacker's Spad 13 with "Hat in Ring" squadron insignia. Charles Newcombe, a model builder by profession and a frequent contributor to the Smithsonian, did this superb model.

SMITHSONIAN AIR AND SPACE MUSEUM

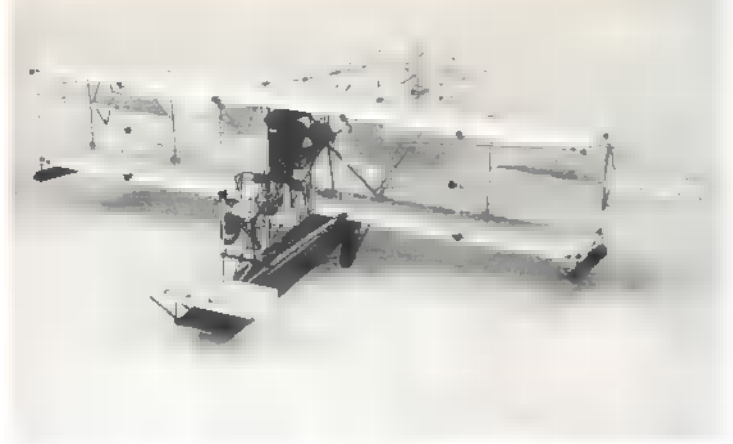
Foremost Scale Model Collector

FRANK AND NANCY PIERCE

PHOTOS FRANK PIERCE AND SMITHSONIAN INSTITUTION NATIONAL AIR AND SPACE MUSEUM

BEYOND any doubt the National Air and Space Museum of the Smithsonian Institution, Washington, D. C., is America's foremost model aircraft collector. Though sometimes overshadowed by nearly 200 full-scale aircraft in the Smithsonian (including Spirit of St. Louis, Wright Flyer, Winnie Mae, etc.), the models represent the ultimate in model builder's skill and the historian's meticulous art.

"The sequence of upper-surface, five-color, lozenge-pattern camouflage for German aircraft in the first World War was indigo, blue-gray, deep mauve, sage green and beige — in that order," says curator Lewis S. Casey. So the beautiful Hannoveraner biplane is sent back for complete repainting, this time with the five colors in proper sequence. Such devotion to technical accuracy has made the Museum the focal point of aircraft enthusiasts throughout the world. Want to know the authentic color scheme for TWA airliners in the early thirties, or the mounting of the machine guns on General Billy Mitchell's Spad, or the navigational aids available to Curtiss Condor pilots? Mr. Casey or one of his



R. S. Nebin contributed this Curtiss A-1, pusher seaplane. Check the side-by-side seating, sled-type main float and cylindrical tip floats and the wire bracing that won't quit.

Charles Newcombe, Trappe, Md., has been building models for the Smithsonian nearly 20 years. A time-worn Avro trainer gets checked by his critical eye as to the possibilities of reconstruction.

The ultimate in model builder's skill and historian's art, make the Smithsonian exhibit a hobbyist's Mecca. See it when you visit the Capitol.

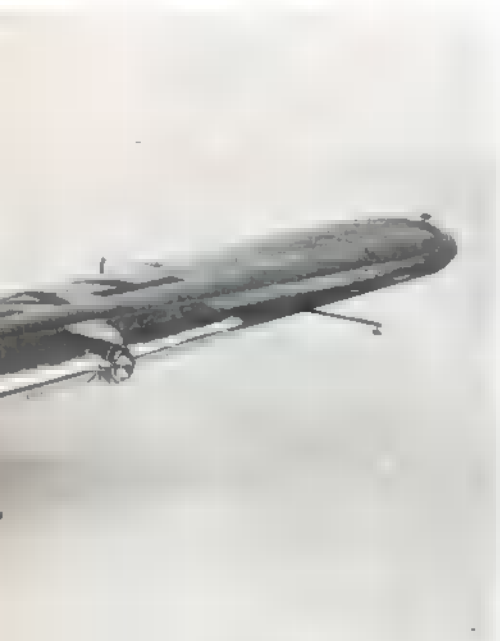
assistants will have the answer.

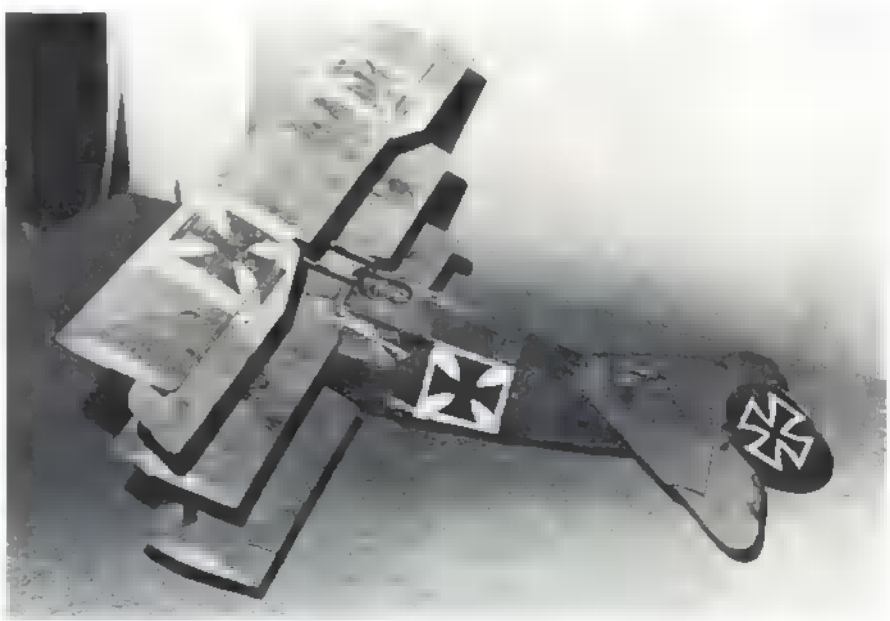
The same painstaking and strict adherence to historical and technical detail is applied equally to reconstruction of full-scale aircraft and to the construction of models. At present, the Smithsonian has over three hundred 1:16 scale models and nearly half ▬ many in 1:48 scale, each as faithful to the original ▬ the model maker's skill allows. Using these scales, the Museum fills gaps in their full-scale collection, making possible the viewing of ▬ many representative types as feasible in the limited exhibit space. A new and larger museum building ▬ pending.

Many models ▬ constructed specifically for the Museum by a small group of amateur and semi-professional model builders. Others ▬ donated ▬ labors of love. Still others, donated by manufacturers, are the metal models used in the initial design, fabrication and sales of full-scale prototypes. Twenty to 30 ▬ models may be acquired from outside

Continued on page 58

Lewis S. Casey, ultimate authority on technical accuracy, is the Air and Space Museum curator. The required degree of accuracy may well be unsurpassed. He would rather abandon a project than to turn out a historically questionable model. He is a stickler for details and perfection.





Once-beautiful Fokker DR-1 is an unfortunate example of damage caused by years of display ▬ wear on paper and balsa construction. Almost beyond salvage, it sits in storage. All new models feature construction with permanent non-aging materials.

Beautiful Ford Trimotor 4-AT-52 was built by Herbert Hartwick. The corrugated, metal finish was tough to duplicate — not to mention detailing the three engines. Most of the plane's interior and cockpit is complete too.

Specter

A durable fast-building combateer that uses a nylon tube for its wing spar. It's a contest winner.

DAN HAY

IN the spring of 1966, I grew tired of building combat models, just to have them wrecked at the weekend contests. I am sure that many of you combat flyers have had the same feeling, as you looked at a pile of wrecked models and thought of the time and money you put into them. I wanted to find a model that could be built fast and cheaply, yet still be rugged enough to withstand the rigors of combat and be a winner. The Specter is the result of this search.

The first thing you will notice is the absence of ribs in the wing. In their place, I have used a nylon tube which doubles as a device to keep an airfoil in the wing and a pen-bladder tank compartment. (These nylon tubes can be purchased at almost any sports shop or department store where golf clubs are sold.) The tube wouldn't break and since there are not many ribs in the wing, there would be fewer parts to repair in the event of a crash.

The flyers in our combat team use pen bladders. It seemed to be an ideal way to cut down construction time because we would no longer have to build a special tank compartment. All we have to do is make sure the tube is sealed off at both of the tip ribs and cut holes for the pen bladder and drain.

The Specter may look weak and flimsy. Actually, the opposite is true. If good, hard balsa is used for the trailing edge, you can build this model without warps. There is less chance of breaking in a collision or wreck, since the wing will twist when it hits something. The same collision with an ordinary model may result in a total wreck, since the wing is ridged and will break rather than twist. This should be quite a relief.

Strength was proved at the Nats, when three models were dived straight into the ground with the only damage being a broken stabilizer. Since then, improvements have been made on the tail section and the new model has been piled in at over 100 mph with no damage. The Specter has been entered in two contests: the Michigan State Contest and the Nats. In the Michigan Contest, it came in first out of 37 contestants; at the Nats, it came out fourth.

I do not use wing tip weight or engine offset; with it will still fly well on any side of the circle in the wind. However, you may want a little engine offset when you go into a stiff breeze on contest day, to be on the safe side. The performance of the Specter has been excellent. It is stable enough so that it can be flown by the feel on the lines; but it still has the turning ability to kill your opponent when he gets into your sight.

The plane has been streamlined as much as possible, so your speed will be determined by your choice of engine and prop. I had best results using a Super Tigre .35 BB and a 9x7 Rev-up prop, using of course, the pen-bladder fuel system. Also, I use a special "ram tube" venturi. It has the same inside dimension as the regular Super Tigre pressure venturi, but it is ¾" longer. I started using the "ram tube" when I found my engines sputtering in some tight maneuvers. The engines run smoother and the needle valve settings don't seem as critical.

The plane will carry a large quantity of fuel. In most contests, you are given one point for each second in the air, up to a maximum of 300 points for five minutes of flight time. Because of this rule, many flights have been won even though the opponent had more cuts. This is because the opponent had to land and refuel, while the Specter kept flying. Depending on the pen bladder you use, you can hold up to seven or eight ounces of fuel if you like long flights.

My ships weighed between 19 and 21 oz. They have been rugged, yet quick and easy to build. The construction is not conventional like most combat models, but you should have no trouble if you read the instructions and cut out all the parts properly.

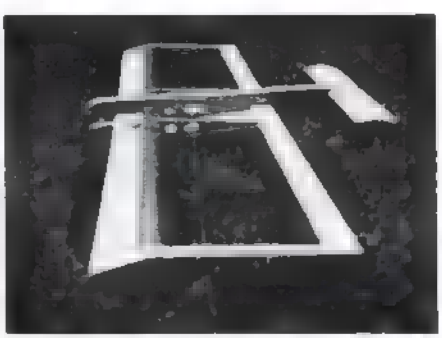
Construction: Go to your local sports shop and get a nylon tube. This tube should be 1¼" in diameter. Use a piece of ½" pine for the crutch. If you don't have any, go to the local lumber yard.

Cut out the required parts. If you plan to make several models during the year, I suggest that you make templates. This will save time on future models. Glue the plywood doubler to the crutch and clamp or wrap with rubber bands until it dries. Place the balsa extension behind the plywood doubler and glue in place. When dry, drill a ¼" hole through the crutch for the bellcrank bolt.

Mark the tube where it goes through

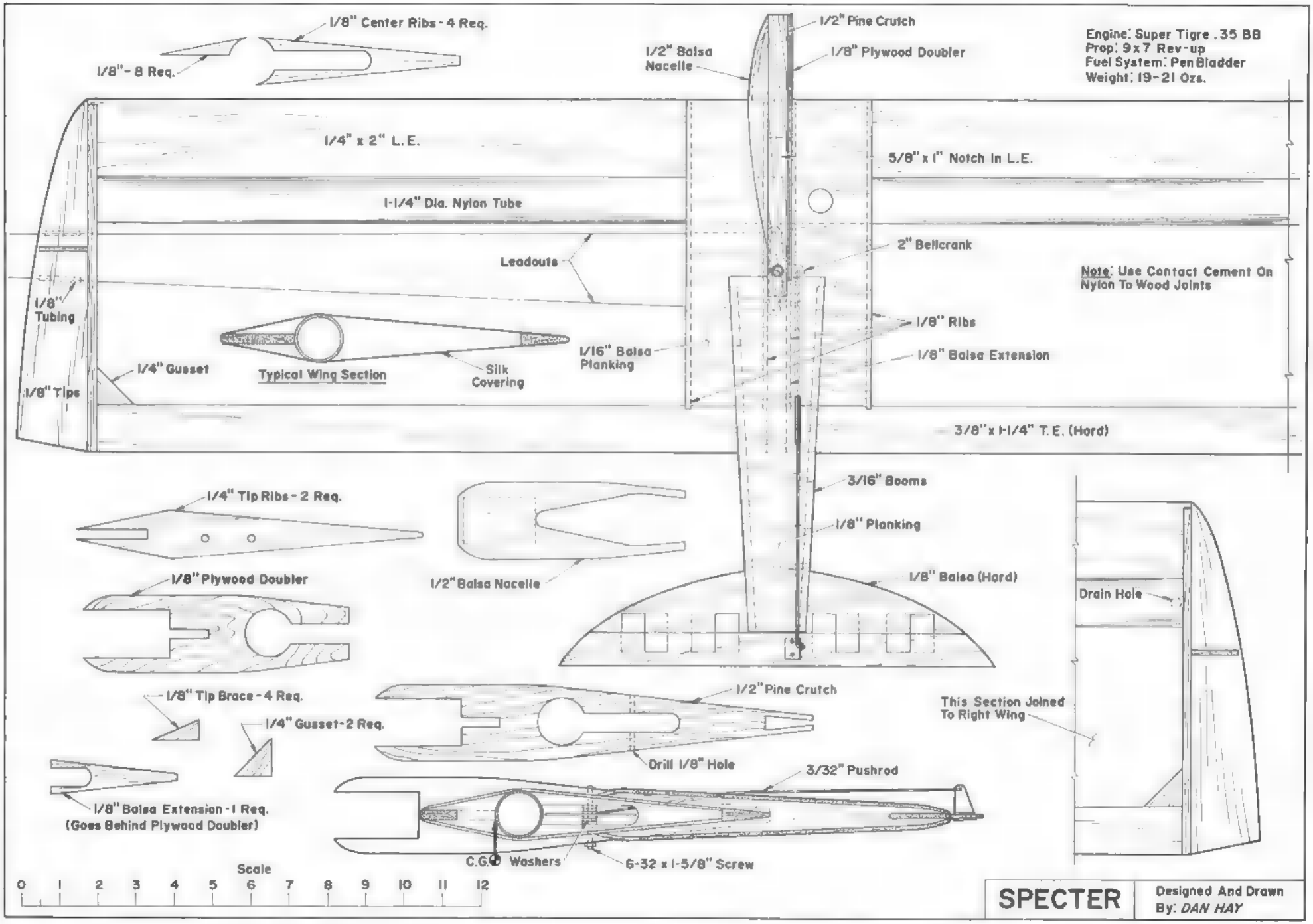
Continued on page 66

is a lean profile pulled along by a S.T. 40 with an extended intake venturi. Makes 100 mph easily.



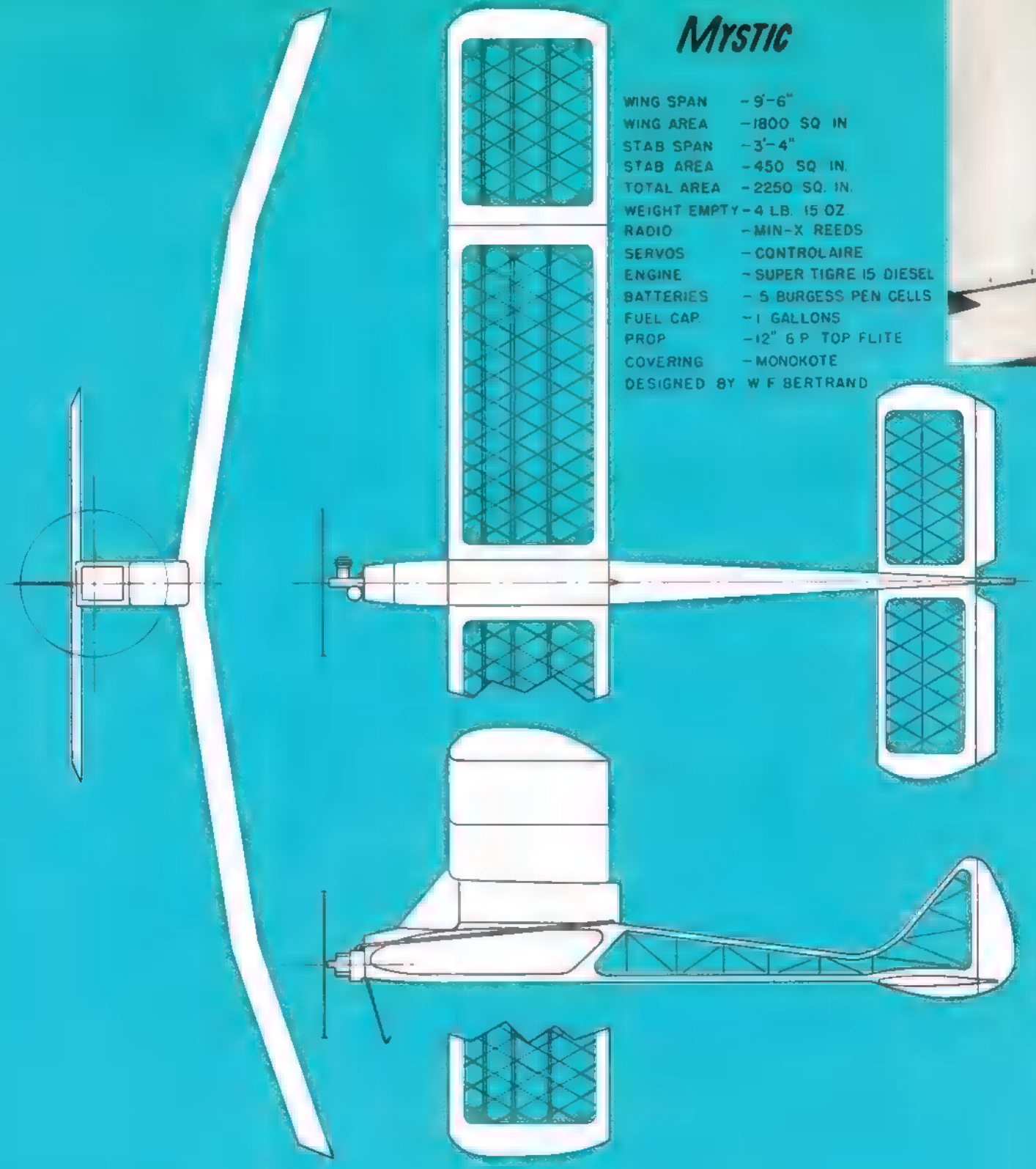
Nylon tube doubles as pen-bladder fuel tank compartment. Semi-diamond type airfoil. Look ma, no ribs?

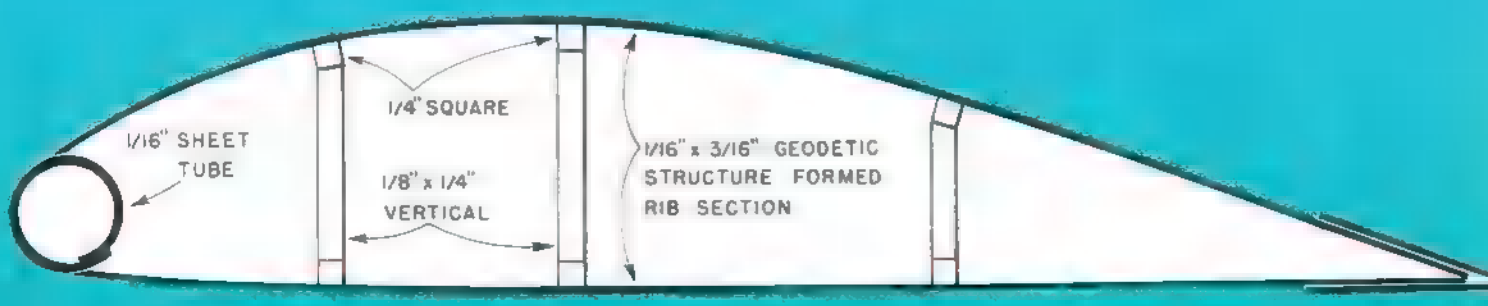
The designer and the winnings earned with his aircraft. The tubular spar won't break and there are few parts.


1/8" Center Ribs - 4 Req.
1/8" - 8 Req.
1/2" Balsa Nacelle
1/2" Pine Crutch
1/8" Plywood Doubler
Engine: Super Tigre .35 BB
Prop: 9x7 Rev-up
Fuel System: Pen Bladder
Weight: 19-21 Ozs.
1/4" x 2" L.E.
5/8" x 1" Notch in L.E.
1-1/4" Dia. Nylon Tube
2" Bellcrank
Leadouts
Note: Use Contact Cement On Nylon To Wood Joints
1/8" Tubing
1/8" Ribs
1/16" Balsa Planking
1/8" Balsa Extension
1/4" Gusset
Typical Wing Section
Silk Covering
1/8" Tips
3/8" x 1-1/4" T.E. (Hard)
3/16" Booms
1/4" Tip Ribs - 2 Req.
1/8" Planking
1/8" Plywood Doubler
1/2" Balsa Nacelle
1/8" Balsa (Hard)
Drain Hole
1/8" Tip Brace - 4 Req.
1/2" Pine Crutch
1/4" Gusset - 2 Req.
This Section Joined To Right Wing
Drill 1/8" Hole
3/32" Pushrod
1/8" Balsa Extension - 1 Req.
(Goes Behind Plywood Doubler)
C.G.
Washers
6-32 x 1-5/8" Screw
Scale
0 1 2 3 4 5 6 7 8 9 10 11 12
SPECTER
Designed And Drawn By: DAN HAY

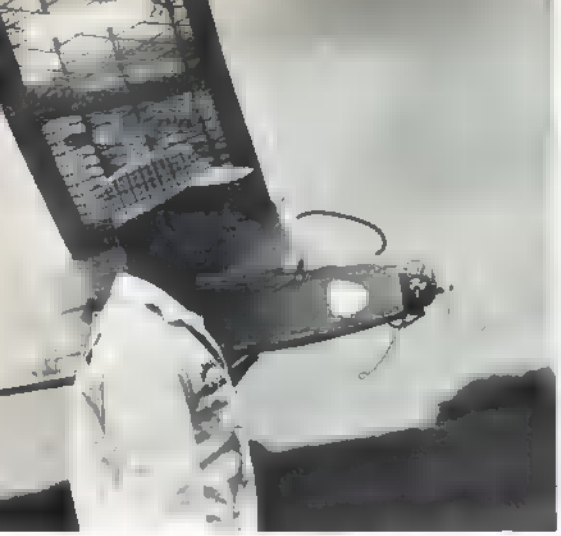
MYSTIC

WING SPAN	- 9'-6"
WING AREA	- 1800 SQ IN
STAB SPAN	- 3'-4"
STAB AREA	- 450 SQ IN.
TOTAL AREA	- 2250 SQ. IN.
WEIGHT EMPTY	- 4 LB. 15 OZ
RADIO	- MIN-X REEDS
SERVOS	- CONTROLAIRE
ENGINE	- SUPER TIGRE 15 DIESEL
BATTERIES	- 5 BURGESS PEN CELLS
FUEL CAP.	- 1 GALLONS
PROP	- 12" 6 P TOP FLITE
COVERING	- MONOKOTE
DESIGNED BY	W F BERTRAND





TYPICAL WING SECTION



A proud man with the smile of success. Note reflectors located for extra visibility.

Near the end of the flight, the Mystic makes a low pass. Many Indian City RC members helped with attempt.

Eleven Hours of Luck

The endurance mission presents the greatest design problems by far. How the world's RC record was broken holds interest for all of us.

WILLIAM F. BERTRAND

AT one time or another, I think all read about somebody setting a record and say to ourselves, "I think I'll take a crack at the record!" This happened to several times before I ever got beyond the stage of talking it over with friends. When Bob Dunham broke the speed record, I started sketching designs. The final urge came in the spring of when Red Gunning, who had been working on the endurance record for time, asked Bill Laubengayer and act timers. He had to land after six hours with radio trouble, but when I watched Red, I thought this shouldn't be too hard. I should try instead of just thinking and talking about it. Then Red threw in the final challenge, "Why don't you try it?" I couldn't resist any more; I would start my ship when I got back from the Nationals. I looked at Red's design, got all the info I could from him, and started give the design of my ship serious thought. I finally got started Sept., 1966.

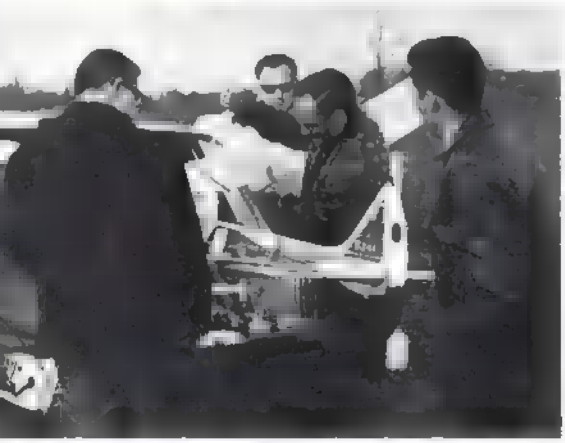
I needed a ship that would carry a maximum payload with a minimum of power. Since the radio was a constant weight regardless of ship size, I decided the bigger the ship, the less percentage of load the radio would be. The FAI rules allow 2325 sq. in.; I decided to go with 2300 sq. in. to stay within the safe limit. The next problem was power. How small an engine could I fly with this monster? I thought maybe a .19, but probably a .25 .29, depending on how light I could build the ship. I started the design using every trick I knew to keep it light and came up with a couple of new along the way.

Continued next page

Skin and bones in flight. Bill removed all the color and adhesive from the MonoKote where it does touch the frame. Less weight. Structure stained by RIT dye aided visibility.

Weight and wing and tail limited by FAI rules to 11 lbs. and 2,325 sq. in. Note how the tank fairs into the fuselage shape. Proper tank design and fuel delivery system all-important.

The fuel system between the main tank and the engine has a header tank with cork float and valve. It's simple and effective.



Fueling the Mystic with three quarts of diesel fuel — 20% Ucon oil, 40% ether, and 40% kerosene.

The fuselage was built with a triangular section behind the wing, because it saved the weight of one piece of quarter square 36" long. The fuselage cross section was kept to a minimum because this meant less wood, silk and dope. All wood was selected with light weight being the prime concern. At this point, the fuselage was constructed and turned out very well at 4½ ounces without covering.

The wing was next. A thick Clark Y-section was chosen for its high lift and tolerance to changes in the center of gravity which might be encountered with fuel sloshing in the tanks. After much thought, it was decided to use geodetic construction. By this method, a wing could be built much stronger than any conventional wing. The wing looked very difficult to build, but once started, I was amazed at how simple a project it was.

There are three spars in the wing: On the inboard sections they are made up of two ¼" squares with ¼ x ⅛" cross-members. On the outboard sections, the spars are made of two pieces of $^{3}/_{16}$" sq. with $^{3}/_{16}$ x $^{3}/_{32}$" cross-members. The leading edge is made of $^{1}/_{16}$" sheet rolled into a 1¼" tube with ¼" thick styrofoam plugs every 3" for compression strength. The trailing edge is conventional $^{1}/_{10}$" sheet, top and bottom. The geodetic structure is made of $^{3}/_{16}$ x $^{1}/_{16}$" on the center sections and ⅛ x $^{1}/_{16}$" on the outer sections. With these methods, the wing weighed only 22 oz. uncovered and would take three G's on an 11-lb. airplane before it was even covered. This would likely double with covering, but I didn't have the guts to try it after it was covered. This point was pretty well proven later, when on a landing, the plane flipped over with a full load of fuel and remained undamaged.

The stab uses a symmetrical section and is made with a single spar built up of two pieces of ¼ x ⅛" with ¼ x ⅛" cross-members. The leading and trailing edge are ¼" sq., with the geodetic structure being ⅛ x $^{1}/_{16}$". The completed stab weighed only 8 oz. without covering.

The entire model is covered with yellow MonoKote, because it has a good durable finish without more weight than lightly doped silk. This weight was then drastically reduced by removing the color from the MonoKote everywhere except around the edges of each panel. It was necessary to leave this, as the color is also the glue that holds the MonoKote. I also felt that I needed color to make the ship visible to see at high altitudes. Visibility was further improved by spraying the entire structure with red dye dissolved into thinner. The dye was Rit clothes dye (I used one package dissolved in a pint of thinner). The package of dye weighs about ½ oz. and thinner completely evaporates. If it all went on the plane, I would add only ½ oz. About 95% of the spray went on my basement floor. Reweighing after a couple days, I could not detect any increase in weight over the undyed structure.

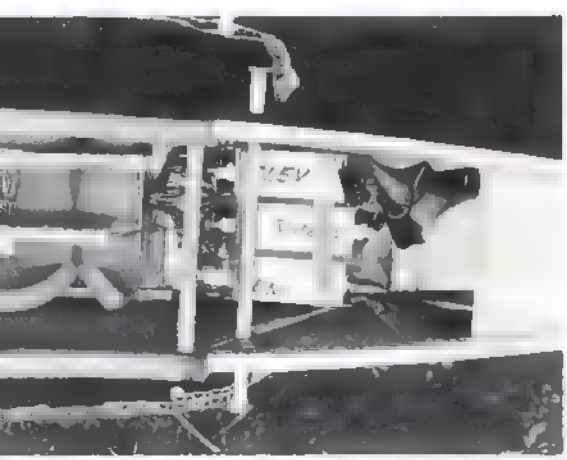
I now had a ship complete, less radio, servos, engine and tank, that weighed only 1 lb. 13½ oz.; it looked like I could make the minimum weight. Decided to use a Min-X reed-type radio, as it has several advantages for this kind of flying. One of these is its superior interference immunity, due to the sharp selectivity of the reeds themselves. Another is the low battery drain on the receiver and servos when no command is called for. To help keep the battery drain as low as possible, I used very wide neutrals on the elevator and rudder. This was done by applying small strips of MonoKote to the ends of the printed-circuit return switches of the Controlaire servos. I used half the rudder travel for trim, and the elevator was trim from half way up to full down. This system allowed the whole flight to be made with only an occasional short beep on the transmitter; the servo motor having to run only a couple of revolutions.

I followed Red's lead on the batteries and used Burgess Alkaline type energizer pencells. In addition to this, I sat in the basement watching TV for many an hour running tests just to assure myself the batteries were adequate.

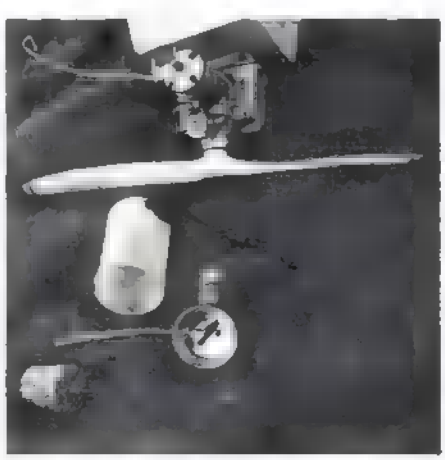
The engine was the real problem now. I started running tests on everything I had and found nothing significant until I came to an old Enya diesel. This engine would swing a 14-6 prop 3750 rpm on only 4 oz. of fuel per hour on the ground. Later, this jumped to about 5½ ozs. in the air. The engine worked well, but refused to throttle almost entirely. I decided to go with the Enya, and let it run full bore.

The next problem was a float chamber. I tried several different designs without making one work to my satisfaction unless it was too large or too heavy. The

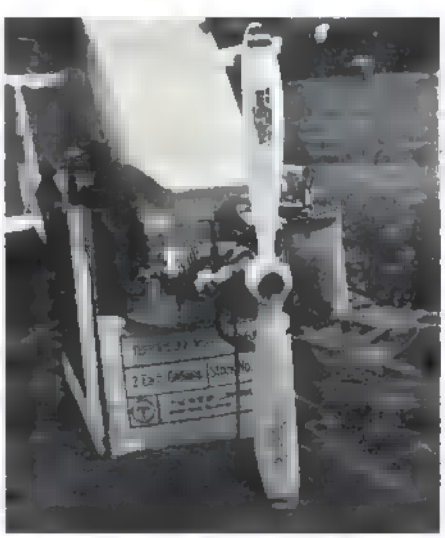
Continued on page 48



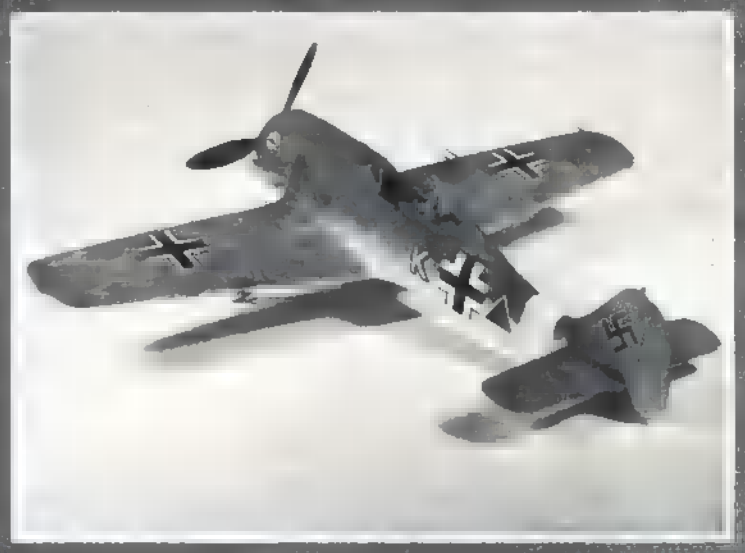
Min-X reed system with very wide neutral Controlaire servos for minimum battery drain and maximum interference resistance.



The tank is the bulky thing below the wing. It is made up of balsa and brass. All fueled up, the plane weighed 11 pounds at takeoff.



An important element in the success of the attempt was the reliable Super Tigre .15 RC diesel, which turned the 12-6 prop powerfully and had a steady slow idle.



Last stage in finish application. Note mottle effect on wing and elevator surfaces. Also visible is demarcation area between dark top, lighter bottom.

It's the finish that counts!

No magic technique! An air brush and practice are the keys to successful camouflage application.

JOHN N. TOWNSLEY

IN response to numerous requests for instructions on how to apply German camouflage, particularly the "German mottle" effect, the F.W. 190 has been selected as one of the best German fighters to show this paint scheme. The model photographed belonged to the Luftwaffe Schlachtgeschwader flown in the African Theater of War in the Western Desert, 1942.

If you are a beginner and new to the Badger No. 200 airbrush, "Gun Practice" is something you must indulge in if you are to become proficient in handling your air brush like a pro. Learning this craft is no different than if you decided to learn to play a musical instrument: five-finger exercises are required. There are many surfaces which can be used to practice on: old scraps from plastic kits; metal cans and bottles, stripped of their wrappers; pieces of broken window glass; in other words, any clean, smooth surface.

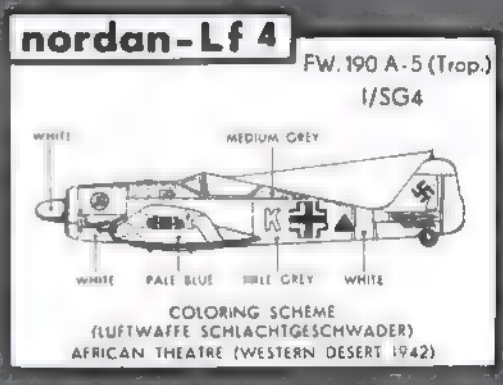
After you have practiced using this method until you feel confident in handling the gun, you can advance to painting a full-color cardboard "mock-up" model. Once you have mastered the mottle effect on the mock-up, you are then ready to do a complete, three-dimensional German desert fighter. The only materials required are one standard size sheet of railroad board, a small tube of Testor's model cement, and one ½" sq. strip of balsa.

Directions for mock-up: 1) Trace side view of plane, elevators (in one piece, with slot cut in fuselage for snug fit), wing (in one piece), two landing gear covers (excluding wheels), spinner, and tail wheel; 2) After all parts are cut out, neatly assemble, using cement; 3) Next cut a few ½" squares of the balsa for supports around the wheel struts, elevators, and wings — cement squares to parts; 4) Use same painting instructions as are given in article under "Painting Instructions," in a later paragraph.

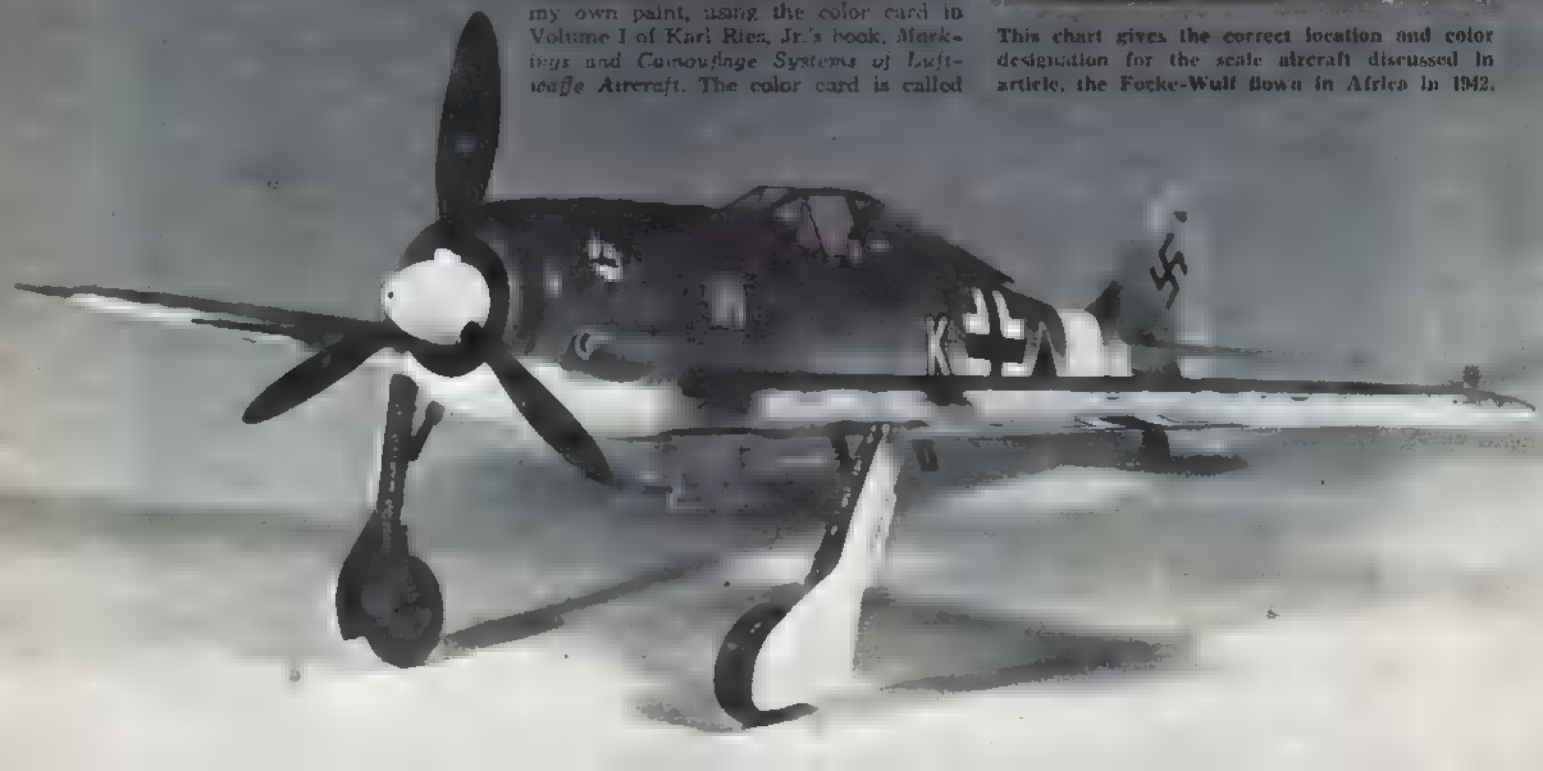
Paints: Many manufacturers make ready-mixed wartime camouflage paints, excellent for the purpose of painting plastic models. However, I prefer to mix my own paint, using the color card in Volume I of Karl Ries, Jr.'s book, *Markings and Camouflage Systems of Luftwaffe Aircraft*. The color card is called "Color Standards LDV 521-2, November 1941," and I used it as a color-mixing guide. All numbers listed in following paragraph refer to those on the color card.

Color scheme: The wing tips, cowling, undersides, fuselage band, and spinner are white, No. 21. The undersurfaces are light blue, No. 65. The light gray on sides, wings, and elevators is No. 76; the dark gray, No. 75, is used for the mottle effect. Propeller blades are flat black with white spinner.

Continued on page 67



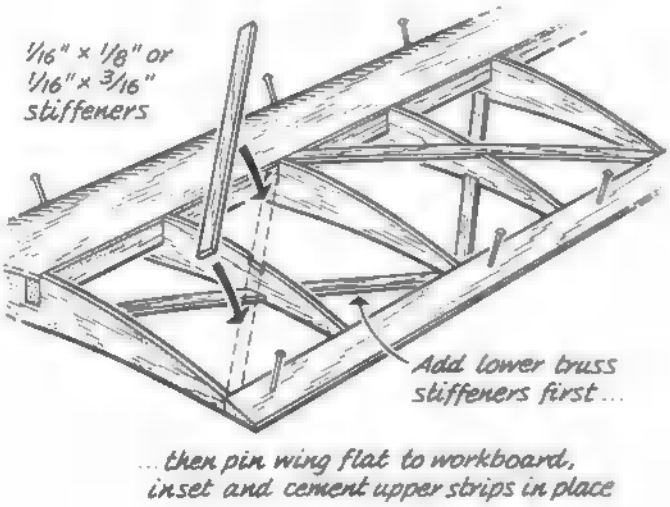
This chart gives the correct location and color designation for the scale aircraft discussed in article, the Focke-Wulf flown in Africa in 1942.



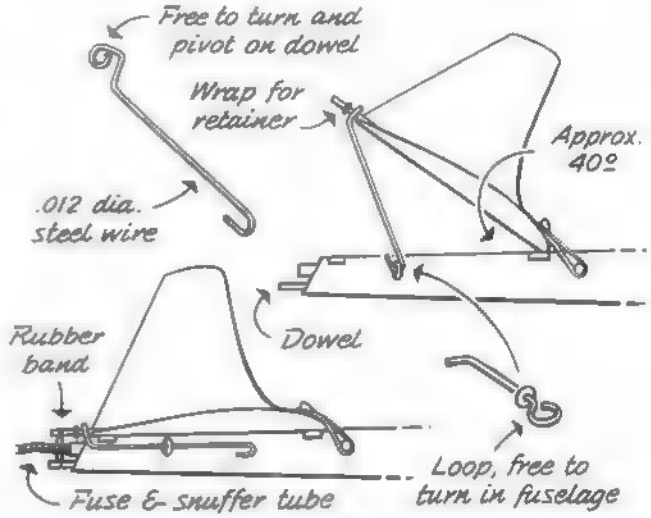
H. A. THOMAS

SKETCHBOOK

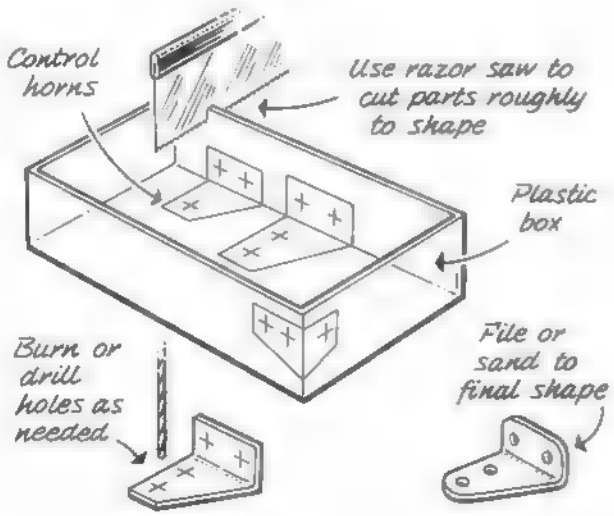
Have a new idea for construction, adjustment ■ operation of model aircraft ■ RC? AM pays $10 for each 'hint & kink' used. Send rough sketch and description to Sketchbook, c/o American Aircraft Modeler, Potomac Aviation Publications, Inc., 1012 14th St., NW, Washington, D.C 20005



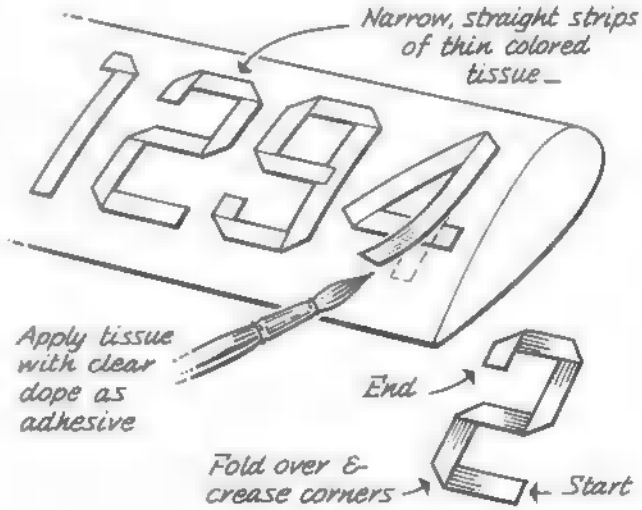
Warp preventive structural knock is submitted by Bob Hanford, Tulsa, Okla. Light diagonal strips inset into upper and lower surfaces stiffen wing frames and lessen likelihood of warps after covering.



Jim Adams, Santa Ana, Calif., uses steel dethermalizer limit wire with special fitting to easily disconnect it for tail surface removal. Part lies flush against fuselage before fuse releases stabilizer TE.



Neat, lightweight control horns for control-line or RC are cut from parts of plastic boxes by George Young, Livermore, Calif. Choose box having material thickness suited to strength needed for particular use.



Straight strips of colored jap tissue or Silkspan can be easily folded to form standard numerals or letters for freeflight model use. Tissue is doped to wing, tail or fuselage after folding. Idea from Barry Dunman, Bulawayo, Rhodesia.

Curtiss Falcon

The prototype Curtiss A-3 Falcon; photo was made at Garden City on October 31, 1927. Firepower from four .30 caliber Browning machine guns was 1200 rounds per minute. Count them — 12 exhaust stacks — one per cylinder!

Jack of all trades — master of a few — sums up the Falcon aircraft series.

PAUL MATT

BORN and bred at the Garden City facilities of the Curtiss Aeroplane and Motor Co. in 1924 and later produced at Buffalo, the Falcon sired many offspring. A number of attempts were made to lump the Falcon series together as one with each used in different ways. This is unfair to the historical significance of the basic design. Despite the many variations and uses for which the Falcons were submitted and the strong family resemblance, each type was different and each had its own personality. We cannot delve into the entire Falcon line within this limited space. However, we can touch upon the development of the A-3 Attack models.

Between 1924 and 1926 the Army Air Corps, for the first time, started a systematic categorizing of its aircraft — thus the A-Attack, B-Bombardment, C-Cargo, O-Observation, P-Pursuit, etc. designations. An extended program was undertaken to procure new aircraft to fill these definite requirements. Prior to this, there were numerous unrelated designations with no equal number of aircraft serving various purposes unsuccessfully.

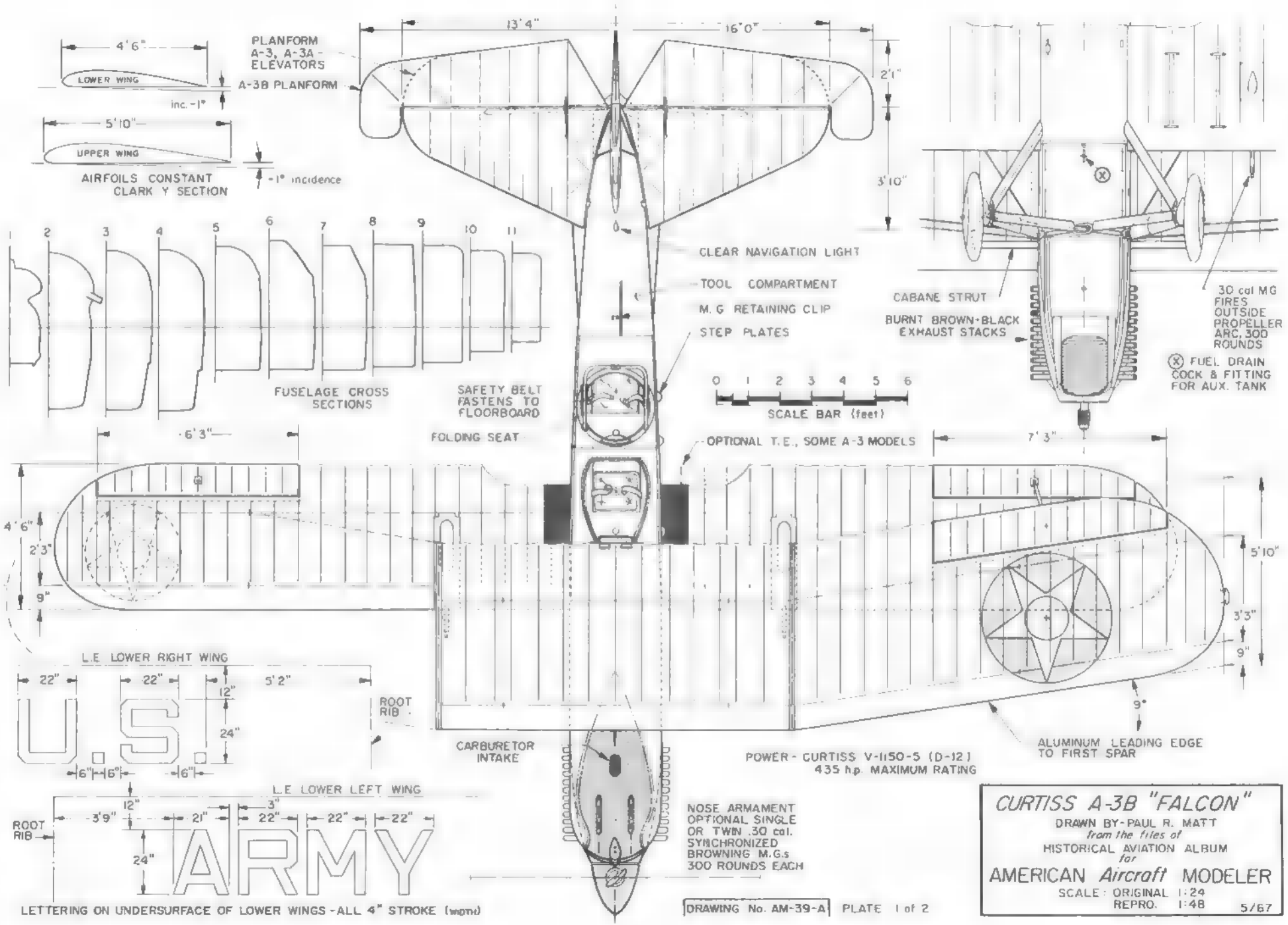
In the fall of 1925 the Air Corps held several open competitions for new aircraft. Among them were the requirements for a two-place observation aircraft to replace the weary DH-4Bs. Private industry welcomed this opportunity to produce their own designs, unhampered by McCook Field Ordnance and Engineering Department specifications. Basic requirements were set forth. Certain military goals had to be met, but the industry had a more liberal hand in the final concept. The only stringent stipulation seemed rather ridiculous from the engineers' point of view; the powerplant had to be the Liberty 12 engine of WWI vintage. This was an economy move by the military.

Eleven manufacturers competed at McCook Field. Each product was assigned

Continued on page 49

Original A-3B Falcon sported a tail skid. Later versions used a wheel; such modifications were made "on scene" wherever planes were based. Rear cockpit Scarff mount for twin Lewis .30's.

Five A-3's were modified into A-3A's. Armament was removed from rear cockpit and a duplicate set of controls and instruments added. Headrest completed the transformation to a "trainer."



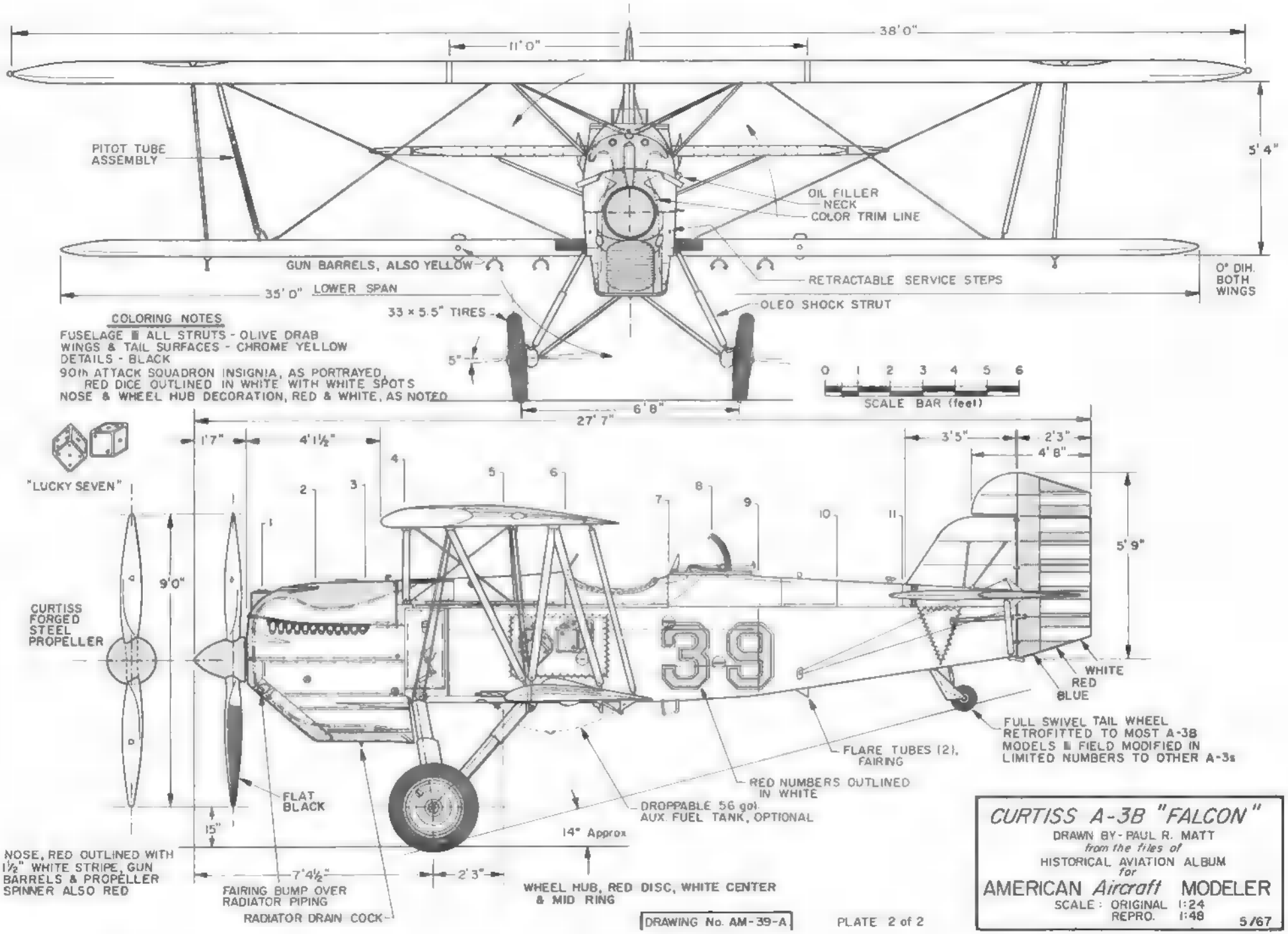
CURTISS A-3B "FALCON"

DRAWN BY - PAUL R. MATT
from the files of
HISTORICAL AVIATION ALBUM
for
AMERICAN *Aircraft* MODELER

SCALE: ORIGINAL 1:24
REPRO. 1:48

5/67

DRAWING No. AM-39-A | PLATE 1 of 2



DRAWING No. AM-39-A

PLATE 2 of 2

CURTISS A-3B "FALCON"

DRAWN BY - PAUL R. MATT

from the files of

HISTORICAL AVIATION ALBUM

for

AMERICAN *Aircraft* MODELER

SCALE: ORIGINAL 1:24
REPRO. 1:48

5/67

Corben Ace built in Australia by Bob Wallen from A.M. plans. Down Under, it is a contest winner and an easy flyer.

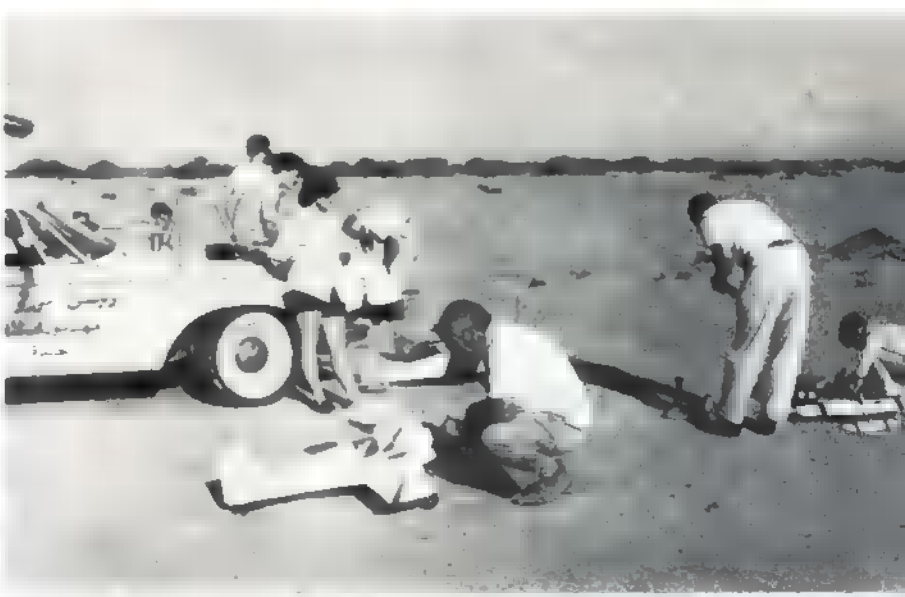
RADIO CONTROL WORLD

A ROUNDUP OF LATEST NEWS

CONDUCTED BY HOWARD MC ENTEE

More on RAFF: This may sound "RAFF-ish," but it's serious business to many modelers! We had some comments on the matter of Radio Assisted Free Flight in this space (p. 26, Dec. 1967 issue) but since considerable interest, gripes, complaints, requests for more info, etc. have been generated on the matter, usually due to misunderstanding, we feel a bit more light can be shed. [redacted] assured that all free flight-[redacted] are not about to put full-house RC in their skyrocketing craft. Many won't use even the simplest single-channel equipment! But like many RCers, the free flight-

Action on the sands of Saudi Arabia! Here they fly only before 7 a.m. to beat the heat and wind. Infinite runways, no interference, no flight lines, no spectator problems, and lots of flying.



The Goodyear line-up at the New England RC Championships last year Orange, Mass. DeNight Special, deBolt Special and Bonzo.

Harold Van Horn (left) is known for his big models. His Bull Pup is shown here with Paul Garber, curator of the National Air Museum of the Smithsonian Institution. Can you imagine making so large a plane, so very beautiful? Yes it flies, and by RC.

ers have a field problem; it's serious to them than to us, since once they launch their planes, where the latter go is in the hands of the gods, the wind currents, thermals, whether the dethermalizer works, and so on. (At least, most RCers have the capability of crashing upwind!) Long chases, lost or damaged (or stolen) planes are some of the consequences.

Some smart free flighter got the idea that radio could help keep the plane from disappearing O.O.S. downwind; don't know who did it first and it doesn't really matter. It's been done, and it works. For the present, RAFF is being used by just test flying; it isn't utilized in competition yet. There would be a frightful howl of protest if someone tried it (someone did many years ago, with results noted just above). But many planes vanish in meets too; not only in test flying restricted areas.

We've had quite a bit of correspondence with Dave Linstrum, who edits the monthly paper of the National Free Flight Society. Dave states that while he will probably never use RAFF himself, he feels it should be available to those who want it. We have to agree. However, when most active RCers think of a lot of non-RC oriented modelers suddenly descending our frequencies (which are getting overtaxed some populous areas, despite the addition of 72 mc) they shudder, and complain. Dave is trying to spread the word among his cohorts to take it easy, check local RC flyers, coordinate such activity with local RC clubs and so on.

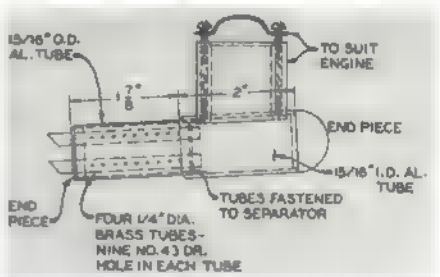
Quite a few dyed-in-the-wool free flighters scorn such advances as RAFF. But quite a few will try it, too. Some doubtful RCers have felt that the RC frequencies are for their use alone; 'tain't so. They are open to anyone who wants to use them, and said users don't even have to be AMA members — despite that the AMA was solely responsible for our obtaining spot frequencies on 27 and 72 mc.

Dave has discussed RAFF with many RCers, including AMA Pres. Cliff Weirick. Cliff feels it isn't all dark as many RCers do. He points out that few RCers utilize 27.255 mc; many manufacturers will not even supply crystals for this frequency. There used to be quite a few traffic light control systems on 27.255 (now all differ- spots far removed, we understand) and also trucking firms have operated there. However, occasional bit of interference would bother a free flight plane equipped with simple escapement — all that is needed for the purpose, though the same interference could wreck a proportional plane.

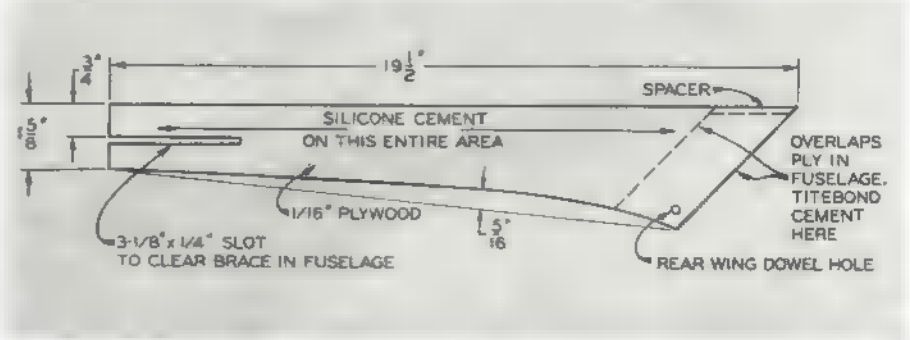
There are quite a few possibilities that must be worked out. For one, a single multi-channel transmitter could be owned by a FF club, with those members desiring to use RAFF each owning a matching perhet receiver. Weirick suggests transmit- might have many channels; thus, there would be the possibility of controlling 20 planes With digital equipment all could be handled simultaneously, each user perhaps having a button the end of a cable to the transmitter. The same deal could be used at contests. This, then, would tie up just a single spot frequency, and one that is very little used present. Even reed equipment could be modified for the job, but in most cases only two planes could be handled simultaneously with it.

There lots of possibilities, fellas, don't panic; let's work it out with the responsible representatives of FF, through such modelers as Dave, Cliff, and the AMA RC and FF Contest Board members. It looks as though RAFF is here, and that it will expand. We RCers have the knowhow and give the FF boys a hand, in a manner that will keep things on an even keel for all of us. And who knows (Dave and other dedicated free flighters should skip this!), we might even lure a few of the cross-country flyers into our ranks. They might even enjoy the experience.

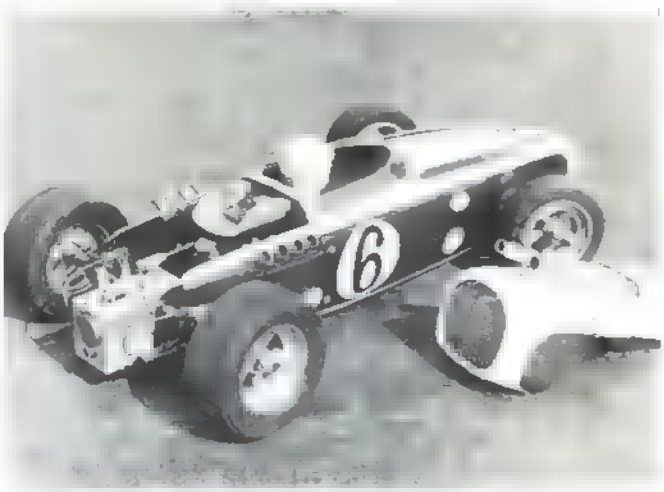
It has occurred to us that there might be some misinterpretation of our remarks on RAFF in the Dec. issue, since we noted that: "it was solely the RC flyers who dug deep into their pockets to finance the AMA campaign to obtain the new 72 mc spots. . . ." While hundreds of modelers did so, the manufacturers also made a tremendous



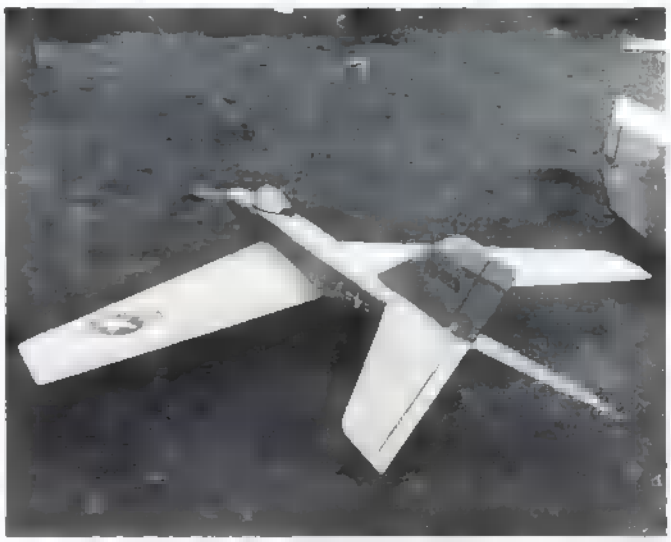
Ronald Lutz applied the Helmholtz resonator principle to create this practical four-nozzle muffler. It is extremely quiet.



A stiff rear for popular Lanier ready-to-fly plastic planes by 1/8th ply doublers. From Paul Benkner of World Engines, Inc.



One-eighth scale RC auto racing with two-speed gear box, a .19 engine, and a clutch! These things are really fast. Radio Operated Auto Racing Association of California is promoting the sport and supplies information and some parts for building them.



This is for real? It performed well at the 1967 "LIDS" meet. Features Marvelite-covered wing and tail sections.

With this small glider Hans Schumacher has set the FAI RC glider speed record at 77.8 mph. It spans 41½" and weighs 44½ oz. This speed bomb is towed aloft by car and then dives to terminal velocity, goes through the speed traps, up and around, and back through once more for both directions.

contribution to the campaign, and though most of them are also RC flyers, we certainly feel they should receive a special hand for their generous corporate donations.

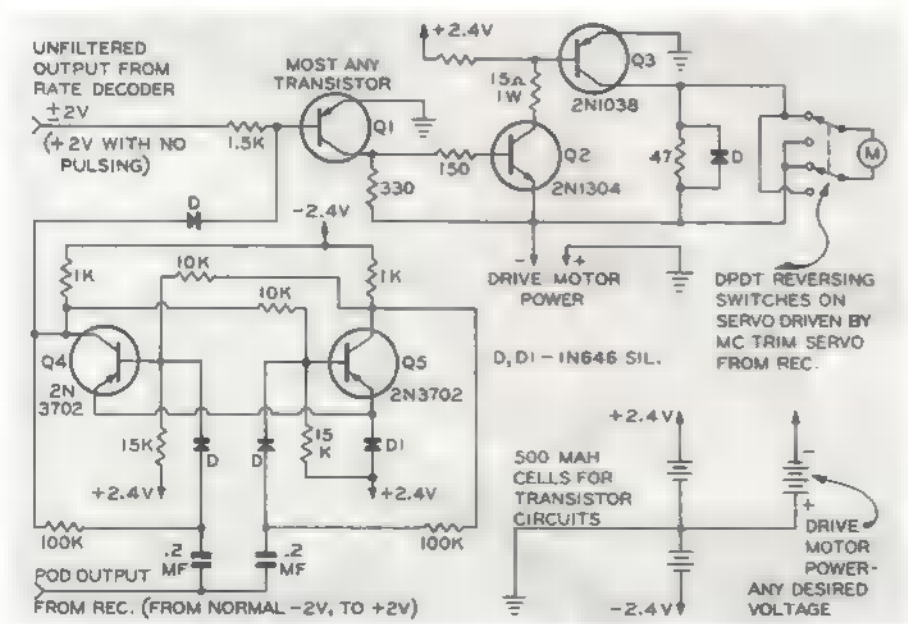
Stiffer Lanier: Some owners of the fine-performing Lanier plastic planes (Bronco, Thunderball and Pursuit) have found the fuselage at the rear of the wing quite prone to wrinkling when the plane has a hard landing. This could mean anything from a jouncing to a crash, in RC lingo! Paul Benkner (Sales Mgr. of World Engines Inc.) offers stiffener seen herewith: it's cut from 1/16" ply, and goes at each side of fuselage — inside, of course. Silicone cement holds it to the fuselage sides, while the forward area, which is cemented to the ply doubler already in the fuselage, is attached with Titebond. There will be a gap just behind this joint, and here Paul applies the Silicone in a thick layer. A small spacer goes in the upper forward corner, also of ply. Slot at the rear fits over a stiffener already in the fuselage.

Paul says total weight buildup is 8 oz. or less; the fuselage beefed this way split forward of the wing, following a 100° vertical dive to earth, but the rear area held up fine. Lo and behold, after this was written and the sketch made, we found that Lanier Industries Inc. (Oakwood, Ga. 30566) liked Paul's idea well enough to offer a pair of ply stiffeners just as we showed for 60c. Lazy types don't even have to cut 'em.

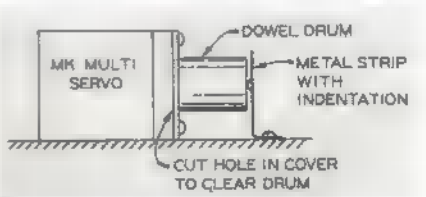
Sail servo: More and more RCers are launching sailboats and here we see a simple sail servo by R. N. Muffly (29 Wood Haven Circle, Ormond Beach, Fla. 32074), made from a self-neutralizing MK multi servo. The cam wheel and top cover are removed, and the printed circuit attached to underside of cover taken out. The five wires are unsoldered from the board, and the two blue wires twisted and soldered together. Do same with the two orange wires, and insulate the joints. Cut off the brown wire and insulate the end. Discard the wiper cam. Make a winch drum from ⅜" dia. dowel, 1½" long. Drill a hole in the center of one end, and the drum may be epoxied to the top gear in the servo. Cut a hole in the servo lid to clear this drum. The servo was mounted on its side in the hull, with a metal strip bearing against the outer end to keep the drum and gear from disengaging with the rest of the gear train. A Min-X reed system allows CW or CCW rotation as desired to handle the sails.

Unusual mufflers: A design which formed part of a study on model engine mufflers undertaken in a college course by Ronald Lutz (9802 McCracken, Cleveland, Ohio 44125) is illustrated. This sketch originally appeared in the club paper of the Lake Erie Gas Model Club; Editor Dick Woodward has kindly allowed us to copy. While the outer shell could be of tin, silver-soldered, Ron used the shell of a Spinaflow muffler. He points out that the most important parts of the deal are the four small tubes; they

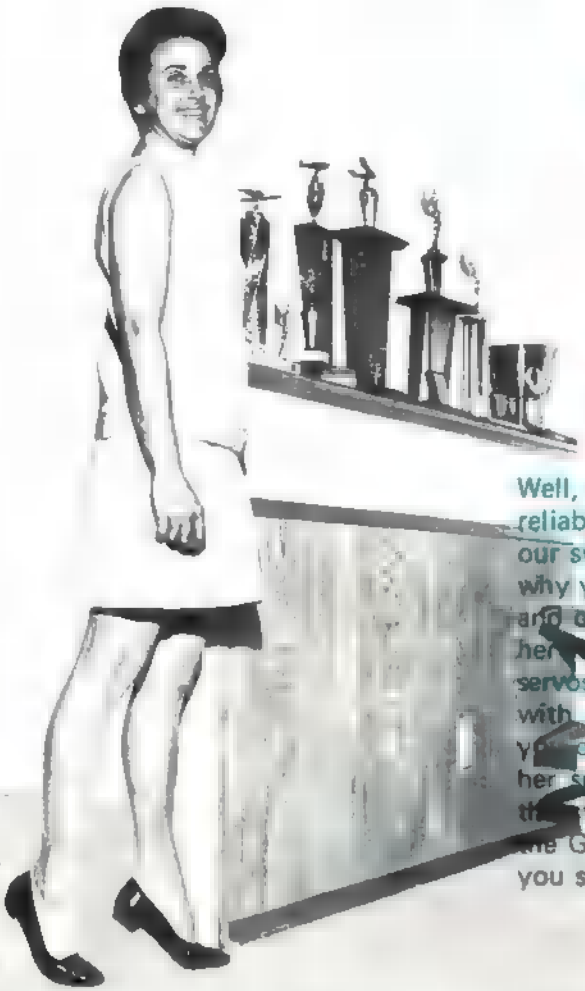
Continued on page 70



Tim Brown's clever circuit for pulse-rate conversion to vary and reverse speed of electric RC car with single-channel equipment.



Drum winch for reeling in and out the sheet of the sail on RC sailboat, modified MK Jap servo; by R. N. Muffly.



INTERESTED IN VITAL STATISTICS?

Well, we're not free to reveal specifics, but she's petite, reliable, strong, and tough to interfere with. Not Ann — our sweet [redacted] LOGICTROL III. We can well understand why you might confuse the two. Ann has a new mini-skirt, and LOGICTROL III has a [redacted] Mini-System that lets her weigh approximately 15 ounces. She has 45% smaller servos, a smaller power pack, and a 50% smaller receiver with advanced circuitry for even greater reliability. Now you can fly much smaller full-house planes, but don't let her small size fool you — she has the same great servo that's in our dynamic LOGICTROL II. She can handle the Giants and the Pee-Wees. Don't buy anything until you see LOGICTROL III — she's a Honey.

and....

DIGI II GHOST

This new economy unit from E. K. combines all the reliability of digital with the simplicity of pulse proportional. You might say it's the "Galloping Ghost" Gone Modern.

See them both at Toledo Feb 24-26

or write

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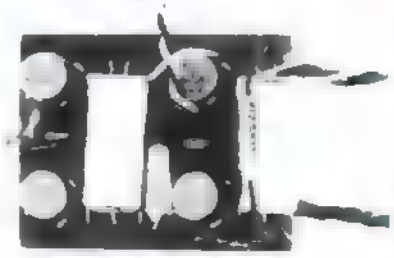


SIMPRO III KIT

The Simpro III kit [illegible] is a refinement of the earlier Simpro units which have appeared in American Modeler. The October 1967 issue contains full info on a relayless version for [illegible] with commercial actuators . . . Does away completely with any adjustments—and provides non-interacting rudder and elevator controls when [illegible] with Ace Jansson or Sim-Plus transmitters. [illegible] most other GG transmitters. Motor control is achieved by full on and full [illegible]. The Simpro III makes into a compact unit Measures 1½ x 1⅞ x ⅛". Designed to work with most of [illegible] commercial proportional actuators available. Go-Around types are required for motor control. Compatible with Rand HR1 and HR2. [illegible] Max, Mini Max [illegible], Ghost, Airtrol, Bellamatics, [illegible] home [illegible] units built around Micro [illegible] motors. (NOTE: 1.8 ohm resistors required only for Micro [illegible] units [illegible] not furnished in kit.) . . . Kit contains reed units, all transistors and diodes, capacitors, resistors and an etched and drilled [illegible] board to duplicate this fine decoder. Connectors not supplied.

[illegible]. 15K43—Simpro III Kit $27.75
No. 15K45—Simpro III assembled and tested $34.95

SIMPRO III DECODER PACKAGE OFFERS

You've got a good GG system, and it's a lot of fun—but you have wished for something that performed as well, in a plane just a [illegible] larger? Well, there's no reason to start from scratch—simply [illegible] the Simpro III decoder unit, along with the required actuators and mounting board, and you [illegible] there! The Simpro III decoder [illegible] adapted to almost ANY existing simple [illegible] system and provide you power enough for engines [illegible] to .45! . . . Extra cost is minimized since you can [illegible] your transmitter and [illegible] (relay or relayless), and with Simpro III, Rand [illegible], [illegible], [illegible], have proportional Rudder, Elevator and positionable Motor Control. Packages include a special 3/64" mounting plate for the Rand units to simplify mounting—template for use with any servo is silk screened on . . . Or, you have a GG system using the LR3. Use the LR3 as the rudder-motor [illegible], and [illegible] a Rand [illegible] for elevator and you cut [illegible] still more with our package #2. . . . The Simpro III decoder pulses fast enough [illegible] there is only a slight dither in rudder; elevator works only on command. On motor, all surfaces cycle through fast [illegible] plane does not respond.

No. 15K1—Simpro III package #1: Contains Simpro III decoder [illegible] as detailed above, Rand HR1 and HR2, and special 3/64" mounting plate for use with YOUR GG receiver and transmitter combination. A $65.00 value. Only $59.50

No. 15K2—Simpro III package #2: Contains Simpro III decoder kit as above, Rand [illegible], special 3/64" mounting plate for use with your GG combo [illegible] your LR3. A $46.00 value. Only $41.50

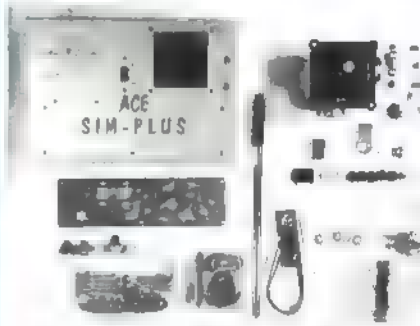
WHAT'S NEW AT ACE R/C

Among the many fine lines Ace represent[s] Coming the new Rand Decoder, MRC-Webra [engines]. Diesel and Glo; Wright Electric Fuel Pu[mps] More-Craft Goodies, Wilhold White Glue (best test), Epoxy Bond products, Jensen, Rocket C[raft] Micro Molding, and many, many more repres[entatives] [illegible] the BEST additions to our highly selec[tive] [illegible].

FLASH!—ACE HAS THE FABULOUS NEW COVE[RING] MATERIAL—SPL AND 990—IN STOCK NOW!

COMING—SIMPRO III +1 COMPONE[NT]

The motor control system for Simpro III w[ill] does away with much of the objection of the around motor control will be in the next issu[e] "American Aircraft Modeler." This is a POD[AR] tector, and signal completely deactivates rudder and elevator circuits, allowing them return to neutral, and does command your m[otor] control to high or low, depending on w[hich] button is pushed. May be used with an An[y] or Bonner relay type [illegible] or with a home b[uilt] servo of Micro Mo TO-3 type. . . . All compo[nent] parts for the Simpro III +1 will be available [and] will be announced in our next ad. . . . A[lso] COMING SOON in pages of "American Aircr[aft] Modeler" [illegible] Don Dickerson's conversion of Testor Skyhawk for [illegible] operation. Ace will h[ave] complete conversion kits for this. They will [be] available as soon [illegible] publication of this mate[rial] is made in this magazine.



SIM-PLUS TRANSMITTER KIT
Design by Dick Jansson

This is the long awaited kit of the Jansson signed Galloping Ghost transmitter. It is a P[roportional] type transmitter, [illegible] it offers more versat[ility] than any other [illegible] unit on the market. Hundreds of Jansson's have been built, and the mod[ified] the circuit improve the basic excellent de[sign] and offer the PLUS factors.

The SIM-PLUS Transmitter Kit is so desig[ned] that pulse rate and pulse width may [illegible] va[ried] generally by minor internal adjustments, so it may fit any of the GG systems on the ma[rket], any Decoder system, the Simpro Systems, the Simplex systems. Has provisions to allo[w] [illegible] used with systems that [illegible] still in works, so that it will not easily obsolete! T[he] frequency may also [illegible] tailored to fit any [illegible] . . . May [illegible] fitted with High Pulse, [which] is usable with Rate Detectors, or the full on full off required [illegible] most of today's GG out[puts] May [illegible] adapted for Rudder Only escapemen[t] proportional, too! Many more PLUS features. All transistorized. Uses 9 volt dry battery [for] full season of flying. Also available for [illegible] ma[ny] Kit contains all components except batt[eries] Instructions [illegible] step by step and most comp[onents] [illegible] have [illegible] produced. Some kit building [skill] [illegible] is desirable.

[illegible]. 11K51—Sim-Plus Transmitter Kit (spe[cify] 26 to 28 MHz. crystal) . . . . . $4[illegible]
No. 11K52—Sim-Plus Transmitter Kit 52.950 MHz. . . . . $5[illegible]
[illegible]. 11K53—Sim-Plus Transmitter Kit 53.100 MHz. . . . . $5[illegible]

NEW! E-Z FILL FUEL PUMPS

Available in 4 [illegible]. To fit plastic bottles and containers. Household type plastic contai[ners] easily converted for fuel pump use. Also rec[om]mended are containers made by fuel supplie[rs]

No. 16L55 E-Z fill pump #4 Stopper will fit [most] household bleach bottles. . . . . $[illegible]

No. 16L103 E-Z Fill Pump #5 Stopper—wi[ll] Idle-X piston power containers. . . . . $[illegible]

No. 16L56 E-Z Fill Pump #6½—will fit ½ gallon plastic bottles. . . . . $[illegible]

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ACE-CLASSIC FULL SIZE PLANS

ACE-CLASSIC Line of plans were originally blished in GRID LEAKS. They include designs Bud Atkinson, Jess Krieser, Bill Winter and any other top model designers and builders. All ans presented in this series of semi-scale anes, and are designed primarily for sports er. The plans are ozalid reproductions of the iginal drawings and full size; folded for of mailing.

ETENPOL AIR CAMPER . . . by Jess Krieser is semi scale of the popular 1920 home built. Designed for .35 engine, it has a 60" span with of 635 inches.
. 13K49—Pietenpol Air Camper, $3.00

CURTIS Scale . . . by Don Knaust is nother semi scale. Designed for . to .25 enes. Has a span of 57 inches and a wing area 570 square inches.
. 13K78—Curtis Robin Classic plan, $3.00.

KY SQUIRE . . . is another Krieser design, excellent for .19 to .45 power. A scale Cessna Skylane type of airplane. Wing 57 inches.
. 13L107—Sky Squire plans, $3.00.

d Atkinson's CORBEN SUPER ACE is designed r the McCoy . and lightweight proportional. as a wing span of inches, and is beautifully tailed. Was featured in AMERICAN MODELER 1966.
. 13K191—Corben Super Ace plans, $3.00.

LONG MIDGET MUSTANG . . . is by Jess laser and is a semi scale Goodyear type of cer. Designed for engines from .29 to . ight modifications make this a good flyer.
. 13K87—Long Midget Mustang, $3.00.

e UGLY STIK . . . designed by Phil Kraft, and iginally called the Square Stik. By adding scaloed ailerons and scalloped elevators and mi-scale type rudder, this .45 to . proporonal test bed resembles the Fokker-Eindecker orld War I plane. Features extremely fast conruction, and designed a proportional ainer.
. 13L108—Kraft's Ugly Stik, $3.00.

R-34 CHALLENGER is built to a scale of 1 inch 1 foot. This is the Krieder-Reisner Bi-plane of e 1920's. Plan is by Jim Dean. Fine for single annel pulse proportional with .
. 13G47—KR-34 Challenger, plans, $2.00.

SNIPE is a sailboat of a very popular design full size. This is a 36" scale model, patterned ter real racing types. Plans contain full il plans, as well some construction details building this model. May built from balsa from plywood. Is it for the R/C fan who looking for something that is different, and yet sy to build.
. 13L189—Snipe plans, $3.00

NEW! BABY ACTUATOR

m Adams Manufacturing the Adam by Actuator. This Baby an entirely new gnet which develops more torque, so that in of its small size, you have than ample wer for .020 and larger equipment . . . The t measures 1" x 1⅛" x ¾". Weight is only ghtly over ½ ounce . . . Torque rod installan must be used with this for adequate power. . . . Unit draws about an erage of 110 ma, which means that batteries the 225 ma size than adequate to wer the unit on 2.4 volts. Use with relayless ceivers to which an AOSK has been added.
. 14K15—Adams Baby Single Actuator, $6.95

NEW! ACE GG PACKAGE!

Galloping Ghost Transmitter by Dick Janson volt battery- Citizenship SSH Receiver and the new Rand pack, with batteries.

If You going GG—Go First Class—With ACE GG!

Now you can go First Class all the way with simple proportional on Galloping Ghost. Ace has pioneered in proportional for 14 years. This is a combination package that we believe takes the best of all of the components that are available and puts them into first class package.

Start with the Galloping Ghost Transmitter by Dick Janson, which has been acknowledged as being of the most versatile, couple this with the new improved Citizenship SSH Receiver and the Rand GG pack, with LR3 and 600 GE sintered and vented batteries. and you have winner! The pack- includes volt battery for the transmitter—the dependable Mallory M1603. The Ace GG package is completely prewired and requires only installation in the plane. . . . Weight of the receiver with GG Pak, LR3, nickel cadmiums, and harness, hooked up ready to install is approximately 7 ounces, yet it has power enough to handle planes with engines up to .35. First Class—Go Ace GG.

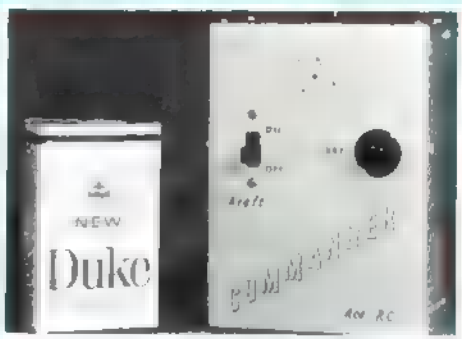
No. 10G1—Ace GG Package, ready to with all batteries $129.50

VARI-CHARGER

The Ace Vari-Charger a useful accessory—it will charge nickel cadmium from 20 mils to 150 mils. is capable charging 12 volt packs . . . The is indexed, and easy to read chart is furnished enables you to set your milliamp reading for the battery pack size you using . . . Completely isolated the AC line supply . . . The unit is housed in a hand- Dakaware which measures 5 25/32" long and 2 21/32" wide and is 1 15/32" deep. Metal cover and on-off switch. This is an extra deluxe item, using highest quality newly manufactured transformer, UL approved line cord, 500 milliamp on-off switch, and full instructions.

Available in two forms, either a kit and completely assembled.

No. 34K21—Ace Vari-Charger Assembled, $8.95
No. 34K22—Ace Vari-Charger Kit, $7.50



COMMANDER TRANSMITTER KIT

The Commander Transmitter Kit designed by Phil Kraft. It is essentially the same transmitter the KT1 transmitter which is completely assembled and sells for $29.95 . . . With our instructions it is quite easy to assemble, and makes a handful packaged power that will control your plane far you can it. A Class C CB license is definitely required, the input is over this is an advantage over transmitters that are licensed under Part 15. In many airplane applications these become marginal performers. This Unit has a domestic antenna is completely removable for of transporting, and also facilitates checking, since antenna may easily removed for quick and practical bench checks. Antenna is base loaded and puts out its punch in a non directional basis. It will not collapse accidentally . . . The Commander uses volt battery of the Mallory type or equivalent for long and economical operation. a pushbutton of the click type for a positive feel and sound when it is depressed. May be used with the Commander Pulser Converter Kit for proportional . Kit has all components you need, including preanodized metal case which x 2½" x 2", completely punched. Four transistors, crystal, all required resistors, capacitors, transformer. Nothing extra to buy except battery. Available on all Class C frequencies.
. 11K D41—Commander Transmitter Kit Deluxe $19.95

MORE THAN JUST A CATALOG FOR 1968!

Our version of Ace R/C Catalog a handbook—has R/C Glossary; To Solder, Pulse Proportional Control for Rudder GG, including Decoders, Symbols, Batteries and Charging, Resistor Color, Transistor Chart, Electric Motor Spec Chart many Sheets refer to again again. Three holes punched, ½ x 11 in designed to to! Will fit Ace Binder, for permanently keeping any of your R/C instruction well . . . In addition it lists Ace R/C Products thousands other R/C items accessories made by other manufacturers world . . . Cost is only $1.00. BUT this is refundable your first order! So actually the catalog costs you nothing. Your order also places your name on the Ace mailing list to regular additional R/C Data info, and newsletters . . . The Ace Handbook-Catalog is a must for the tinkerer, Sunday the sport flyer. We R/C your catalog buck on a round trip today. You can't lose!

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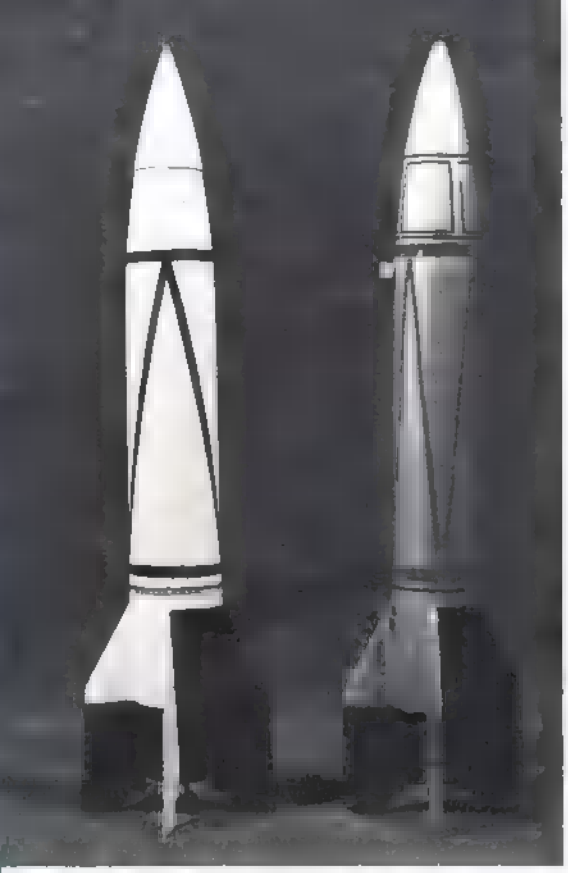


These scale model German A-4's were built to same scale; English system used on the left model, and the right was built in Europe with the metric system. There's no apparent difference.

G. HARRY STINE

WITH the issuance of the 1967 edition of the U.S. Model Rocket Sporting Code, the NAR and model rocketry began the slow-but-sure conversion from the old English system of measurement to the international metric system late in 1967. By the time you read this, the change-over will be well under way.

Why did the AR and the Model Rocket Manufacturers Assoc. decide to shift over to the metric system? What was wrong with the old, familiar English system? What does this mean, and how does a model rocketeer make the necessary conversions between the two systems? These are some of the questions likely to be asked by model rocketeers. Some of the answers are in this article.

The United States is the only nation in the world that has not adopted the metric system officially. However, it is used in the U.S., as it is around the world, in scientific work. The international FAI sporting codes for aeronautics and astronautics are in the metric system. Since the NAR Contest Board tried hard to make the new NAR rules compatible with the FAI model rocket rules, this was one reason for the change. It is much easier for us to communicate with model rocketeers of other nations, and the compatibility of the NAR and FAI rules makes it [illegible] to establish international FAI records.

Model rocketry has its roots deep in science and technology, both as a sport and as an educational tool. Therefore, since the international measurement language of science and technology is the metric system, this was another reason for making the switch.

The metric system is much easier to work with, although this might not seem to be true when you first dig into it. We have grown up with the English system; therefore, it is most familiar to all of us. But, once we are taught the metric system, it becomes second-nature. I have very little trouble working in either system now, and I can convert from one to the other in my head most of the time. The metric units are convenient and easy to use, and (most important) they are sized correctly. (A millimeter is a little smaller than 1/10 of an inch, for example, and a meter is just a little longer than a yard, whereas a kilogram is 2.2 pounds.)

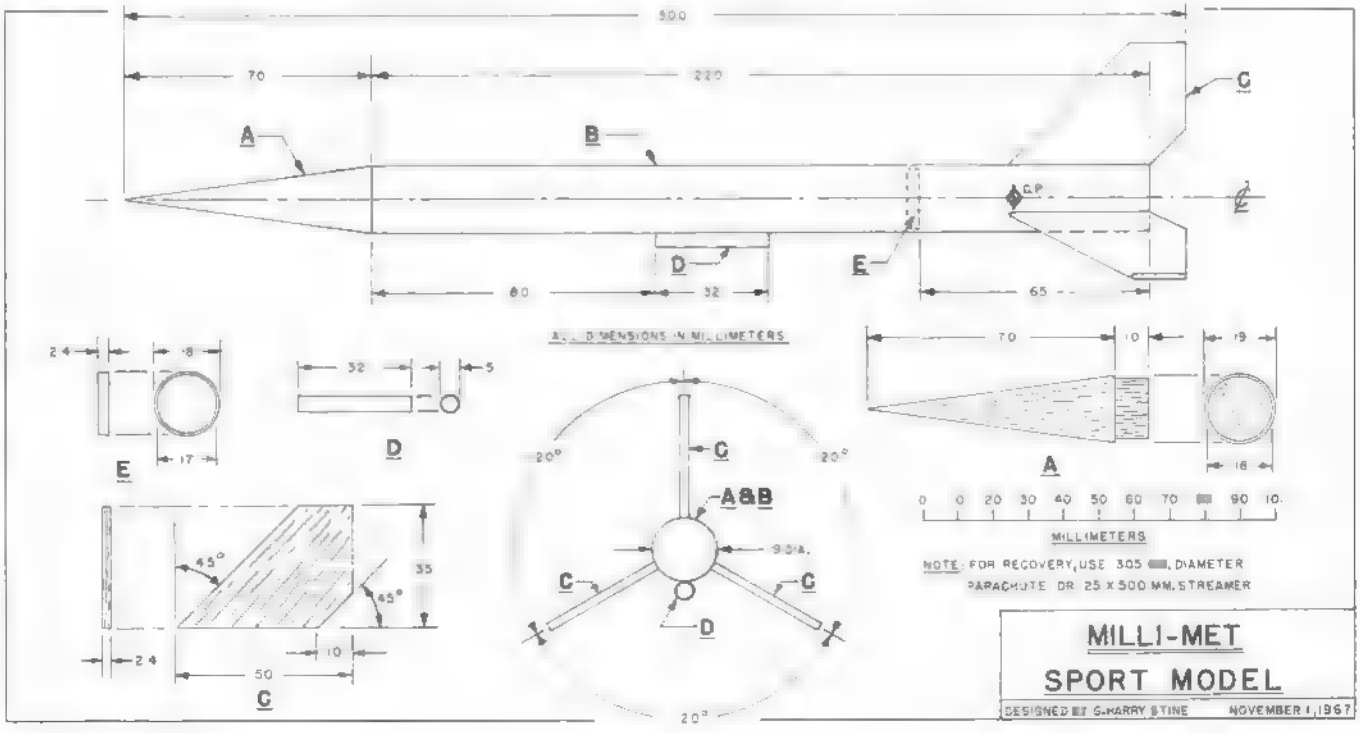
In the English system, we've got a mixed-up set of units derived in odd-ball ways from history. There are 12 inches to a foot, three feet to a yard, 5280 feet to the mile, 16 ounces to the pound, four quarts to the gallon, etc. There is no way to logically relate length, weight, and volume in the English system. (How many cubic inches in a gallon, huh?) We also get fouled-up between pounds-weight, pounds-force, poundals, slugs, and other physical units.

The metric system eliminates all that. It was set up around a unit of length called the meter, which was originally

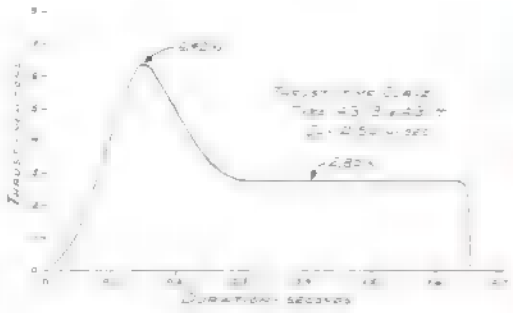
METRIC/ENGLISH EQUIVALENTS

1 meter = 39.37 in. = 3.28 ft. = 1.094 yds.
25.4 mm. = 1 in.
453.6 grams = 1 lb.
28.35 grams = 1 oz.
1 kilogram = 2.2 lbs.
4.46 newtons = 1 lb.
1 standard gravity (g) = 980.7 cm. per sec. per [illegible].

Mystery Model: the "Milli-Met" was completely designed using the metric system and is built from existing U.S. commercial parts. Can you identify them? Build it to get acquainted with metric model rocketry.



METRIC



Old, familiar thrust-time curves look the same, but thrust units are different in the metric system. Here's the Type A.8-3, now called Type A3-3, as an example.

supposed to be one one-millionth of the circumference of the earth (but it isn't because they did not know the exact dimensions of the earth back in the 18th Century when they came up with the meter-length standard!). Regardless, the international primary standard meter is a platinum-iridium bar kept at the International Bureau of Weights and Measures at Sevres, France. There are two lines scribed on this bar and, when the bar is at 32 degrees F. (0 degree C.), the distance between the scribe marks is exactly one meter. Actually, the meter is now officially defined as the wavelength of light at a certain frequency.

Everything in the metric system derives from this basic measure of length: the meter.

The metric system is a decimal system. One millimeter is one one-thousandth of a meter; a centimeter is one one-hundredth of a meter; a kilometer is one thousand meters.

The unit of weight, the gram, is derived from the weight of a volume of water of one cubic centimeter at 32 degrees F. (0 degree C.). One thousand grams is one kilogram, or a thousand cubic centimeters of ice-cold water.

A kilogram of ice water (or a thousand cubic centimeters of water) equals one liter: the measurement of liquid vol.

If you drop something in the gravity field at the earth's surface, it will fall and accelerate at 980.7 centimeters per second per second (32.17 feet per second

Continued page 72

CONVERSION TABLE

MULTIPLY	BY	TO
millimeters	0.0394	inches
centimeters	0.3937	inches
meters	39.37	inches
meters	3.281	feet
feet	0.3048	meters
inches	25.4	millimeters
ounces	28.35	grams
grams	0.0353	ounces
pounds-force	4.46	newtons
pound-seconds	4.46	newton-seconds
feet per second	0.3048	meters per second
meters per second	3.281	feet per second

model rocketeer
NATIONAL ASSOCIATION OF ROCKETRY
1239 Vermont [illegible]
NAR

NARAM-10 SITE

The NAR Contest Board Chairman is presently studying proposals made by several sites to host NARAM-10. It is hoped that a site will be chosen within the next 30 days and that members can be informed in this column next issue. Numerous sites have been mentioned, but at this writing no firm decision has been made.

LEGALITY QUESTION

Major Carroll Shaw, Chairman, National Fire Protection Association Pyrotechnic Committee, reports that as of November 1, 1967 there were no strong objections to the NFPA-NAR developed Code for Model Rocketry. The tentative code will undoubtedly undergo some minor changes before it reaches its final form. Voting on the final form of the code will take place in May, 1968.

Once the code is approved it will then be up to local and/or state jurisdictions to adopt the code for their community or state, whatever the case may be. Remember, competent adult leadership will be needed to "see" the code through the proper channels.

CERTIFIED ENGINE LIST

The following model rocket engines have been certified by the Standards and Testing Committee, effective as of October 28, 1967.

Manufacturer or Source: Centuri Engineering Co.

MFG. TYPE	NAR TYPE	SIZE (mm)
¼A.8-0	¼A3-0	18 x 70
¼A.8-0S	¼A3-0	18 x 45
¼A.8-2	¼A3-2	18 x 70
¼A.8-4	¼A3-4	18 x 70
¼A.8-4S	¼A3-4	18 x 45
½A.8-0	½A3-0	18 x 70
½A.8-0S	½A3-0	18 x 70
½A.8-2	½A3-2	18 x 70
½A.8-4	½A3-4	18 x 70
½A.8-4S	½A3-4	18 x 70
A.8-0	A3-0	18 x 70
A.8-3	A3-3	18 x 70
A.8-4	A3-4	18 x 70
B.8-0	B3-0	18 x 70
B.8-2	B3-2	18 x 70
B.8-4	B3-4	18 x 70
B.8-6	B3-6	18 x 70
B3-0	B13-0	18 x 70
B3-5	B13-5	18 x 70
B3-7	B13-7	18 x 70
C.8-0	C3-0	18 x 70

Manufacturer or Source: Flight Systems Inc.

MFG. TYPE	NAR TYPE	SIZE (mm)
B-1.75-0	B8-0	21 x 70
B-1.75-4	B8-4	21 x 70
B-1.75-6	B8-6	21 x 70
C-1.75-0	C8-0	21 x 70
C-1.75-6	C8-6	21 x 70
C-1.75-8	C8-8	21 x 70
D-.915-0	D4-0	21 x 70
D-.915-6	D4-6	21 x 70
D-.915-8	D4-8	21 x 70
E-.835-6	E4-6	21 x 93
F-1.3-7	F6-7	27 x 152
F-18-0	F80-0	27 x 152
F-18-8	F80-8	27 x 152

Manufacturer or Source: Model Rocket Industries

MFG. TYPE	NAR TYPE	SIZE (mm)
A.8-2	A3-3	18 x 70

Manufacturer or Source: Rocket Development Corp.

MFG. TYPE	NAR TYPE	SIZE (mm)
½A1.1-2	½A5-2	18 x 70
½A1.1-4	½A5-4	18 x 70
A.8-0	A3-0	18 x 70
A.8-3	A3-3	18 x 70
A.8-5	A3-5	18 x 70
B.74-0	B3-0	18 x 70
B.74-4	B3-4	18 x 70
B.74-7	B3-7	18 x 70

Manufacturer or Source: Estes Industries, Inc.

MFG. TYPE	NAR TYPE	SIZE (mm)
¼A.8-0	¼A3-0	18 x 70
¼A.8-0S	¼A3-0	18 x 45
¼A.8-2	¼A3-2	18 x 70
¼A.8-2S	¼A3-2	18 x 45
¼A.8-4	¼A3-4	18 x 70
¼A.8-4S	¼A3-4	18 x 45
½A.8-0	½A3-0	18 x 70
½A.8-0S	½A3-0	18 x 45
½A.8-2	½A3-2	18 x 70
½A.8-2S	½A3-2	18 x 45
½A.8-4	½A3-4	18 x 70
½A.8-4S	½A3-4	18 x 45
A.8-0	A3-0	18 x 70
A.8-3	A3-3	18 x 70
A.8-4	A3-4	18 x 70
B.8-0	B3-0	18 x 70
B.8-2	B3-2	18 x 70
B.8-4	B3-4	18 x 70
B.8-6	B3-6	18 x 70
B3-0	B13-0	18 x 70
B3-5	B13-5	18 x 70
B3-6	B13-6	18 x 70
B3-7	B13-7	18 x 70
C.8-0	C3-0	18 x 70

Notes:

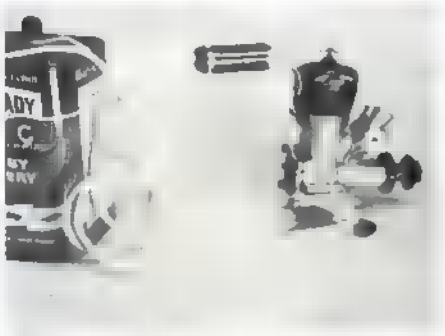
1. Certification has been withdrawn on engines manufactured by the following firms:
   Coaster Corporation
   Prodyne
   Uni-Jet
   In all cases the manufacturer is no longer in existence and the age of the engines made by them now leaves reliability in question.
2. Centuri Engineering Co. "Mini-Max" engines not yet certified.
3. Rocket Development Corp. "Enerjet" engines not yet certified.
4. Rocket Supply Co. 18 x 70 mm. engines not yet certified.

This list is subject to change at any time.

NEW PRODUCTS CHECK LIST

Write the manufacturers for more data; tell them, "I saw it in American Aircraft Modeler."

K & S Engineering/Soldering Iron Tips. Some time ago K & S introduced their fine pencil soldering iron (M300); a compact and well-balanced ■ W. unit that had a stay-cool handle. Now extra tips ■■ available for this iron in two sizes — each ■■ comes in a straight, four-flat pyramid tip and an offset chisel tip. The smallest tip is tiny enough by ■ wide margin for P. C. board work. Cost per tip is 50c or an assortment of four types is $1.98. K & S also sells that covering favorite, Silkspan and those handy telescoping tubes of brass and aluminum i■ square and round shapes. Ask for their product list, then make your choice: K & S ENGINEERING, 6917 W. 59th St., Chicago, Ill. 60638.

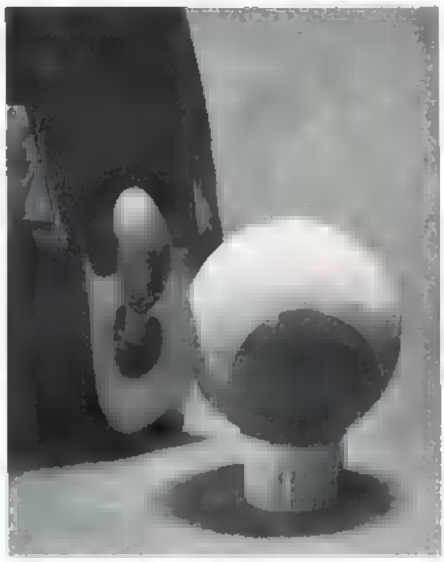


Tatone Products/Hang-On. As the photo shows it's a glo-plug connector. Use it with 'wet' or 'dry' batteries. Simply hang i■ ■■ the engine, one contact looped over the plug and the other resting against the cylinder or crankcase. The Hang-On's weight assures good contact. It works on .049's to .60's. Price with wire and battery terminals is $1.49.

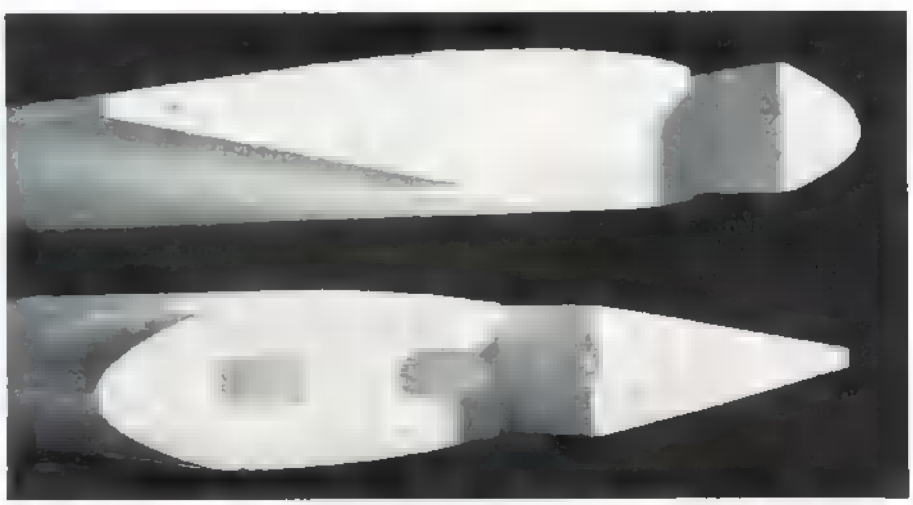
Increased product demand has made it necessary for Tatone Products ■■ ■■■■ into larger quarters. When inquiring about any of their extensive line of timers, motor mounts and other accessories, write: TATONE PRODUCTS, 4719 Mission St., San Francisco, Calif. 94112.

Kayeff, Inc./Model Boats. Kayeff imports the popular boat kits made by the Danish firm, Billing Boats. The extensive line ranges from the "Wasa," a Swedish ship from 1628; "Santa Maria," a true replica of the original (drawn from ■■■■ sketches); ■ three-masted Frigate "Jylland" that is 40" long to the "Zwarte Zee," world's most powerful tug. Among others ■■ the "Danmark," Danish Merchant Navy flagship; "Elbe I," a lightship and the "Dragon," ■■ all-wood sailboat of International Racing specs and ■ length of 30". Many of these can be adapted to RC. Fittings are excellent — in fact, fitting sets ■■ sold separately. For detailed information: KAYEFF, INC., 511 Campesina Rd., Arcadia, Calif. 91006.

Sterling Models/Coverite. Sterling is out to make all other covering fabrics obsolete. First off — Coverite is ■ synthetic fabric, many times stronger than silk, that i■ heat shrinkable. Next, ■ its great capacity for stretching over compound curves. Sterling "frosted the cake" by coating one side of the material with a heat-activated adhesive; more about this later. How does it work? Coverite ■■■■ with a backing sheet, protecting its tacky adhesive. To use: cut a piece out, backing sheet and all, somewhat larger than ■■■ to be covered. Peel away from backing and lay it on the model. The tacky surface allows you to lift and replace Coverite, smoothing and working out wrinkles. We applied a portion to a small ball (less than 3" dia.). In this way a check to ■■ how compound curves could be easily covered. First photo was made at this stage. A final step requires a household iron to seal all edges. Passing the hot iron over the fabric removes any looseness. Second photo shows the completed application of the Coverite material.



The adhesive back makes Coverite easy to use. Because of it, the material has more body, making it easy to handle. There's ■■ rush in fitting the fabric. Remember, however, that all seams must overlap at least ¼". Also the adhesive, in effect, seals Coverite. Less finishing material is needed — Sterling claims only about one half of the normal amount is required to give an equivalent gloss ■■ with silk. As a synthetic Coverite is rot, mildew and weatherproof. White is available now in 22 x 40 inch sheets at $2.95 each; colors will come later. Send for a free sample—Sterling will patch your next puncture; give it a try. STERLING MODELS, Belfield & Wister Sts., Philadelphia, Pa. 19144.

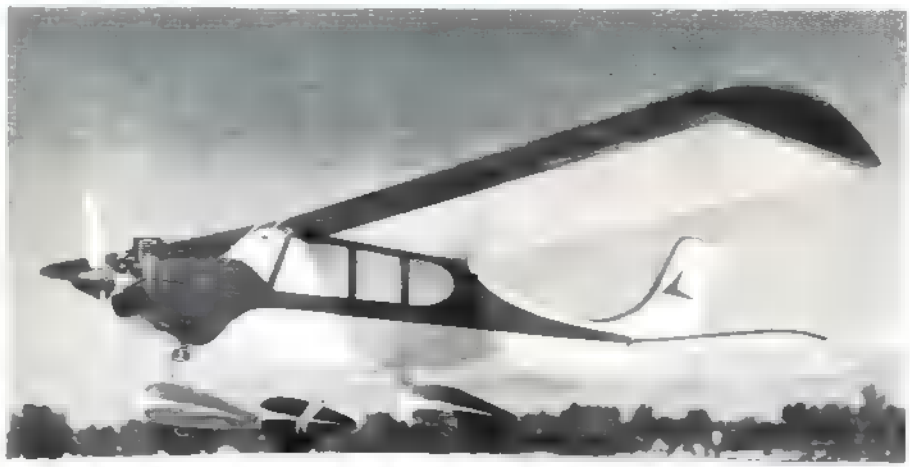


Warner Industries/Foam Wing Cores. Warner is a firm "foam" believer. In fact they produce wing ■■■■ for 17 different RC models plus five ■■■■ for popular controline ships. The Nobler ■■■■ shown, for example, sells at $7.45. The rest range from $6.45 ■■ $11.45. All cores are ready to cover, including correctly cut dihedral angles. Bellcrank, lead-out wire and servo cut-outs and the landing gear cutouts are cleanly and accurately made. Fiberglass reinforcing strips, instructions and a list of recommended adhesives are included. A bead type foam is used. Their core list is sent on request. WARNER INDUSTRIES, INC., 259 Hosack St., Columbus, Ohio 43207.

More-Craft Products/Anten-Away. Quite a few RC flyers prefer a vertical antenna on their aircraft. Mount one of these, though, and prepare to parry thrust after thrust. Well More-Craft came up with a puncture solution — retract your vertical. They sell the hardware pack for $2. Basically it includes an 18" nylon tube for the antenna to retract into and a locking chuck to fix it in position. There are other small fittings too. You furnish the .045" music wire for the antenna itself. Kit makes a neat installation. When writing, please note their new address: MORE-CRAFT PRODUCTS CO., 134 Devon Rd., Colonia, N. J. 07067.

Aerotronics/Engine-Loks. Tough, fuel-proof Delrin Engine-Loks allow you to mount an engine to its mount plate without need for blind-nuts, lock washers or what have you. Of interest to those modelers using break-away mounting plates of micarta, plastic or ply in the ⅛" thick size, the Engine-Lok provides a pad for the engine to sit on, cushioning against vibration, and a secure grip to keep the screw from working loose. Each pack of four, ⅛" size, costs 89c. Soon they will be available in the 3/16" thick plate size for use with larger engines (over .50 cu. in.). AERO-TRONICS, 109 Chatham Lane, Oak Ridge, Tenn. 37830.

Kraft-Hayes Products/KPS-9 Digital Servo. New servo being supplied with all Kraft propo systems is revolutionary in concept. A variable capacitor replaces the more commonly used resistive feedback element. Kraft, confident of the design, backs it with a five year guarantee. See McEntee's New in RC column this issue. Servo replaces KPS-7's in all 'B' and 'S' series systems. Cost is $39.95. KRAFT-HAYES PRODUCTS, INC., 2466 Seaman Ave., S. El Monte, Calif. 91733.



Sturdi-Built Models/Cadet RC. Novice RCers or the inexperienced builder will be interested in the Cadet RC Trainer. Building time and effort are reduced with this kit. The wing is plastic-covered foam, fin and stabilizer are sheet balsa and the fuselage, wheel pants and wing tips are molded of plastic. The few parts remaining are pre-cut for you. Sleek looking, the ship may be built with regular or tri-cycle landing gear, using formed hardware supplied. Wing span is 56"; weight, less RC gear, about 4 lbs. Fly it with a .29 or .35. Kit price is $34.95. STURDI-BUILT MODELS MFG., Rte. 2, Box 218, Meridian, Idaho 83642.

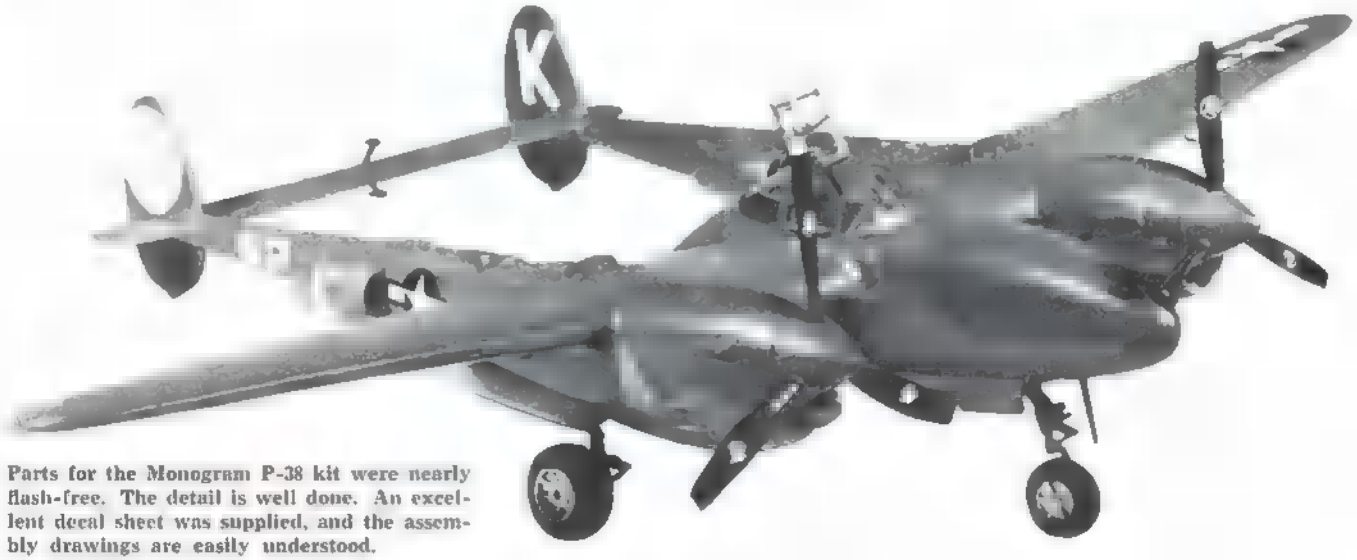
Min-X Radio Dual Range System. Min-X based a complete pulse propo system on Rand's Dual Pak. See McEntee's New in RC column this issue. Included is a modified Pulsmite Tx (model DRT with a high and low pulse range), SH-1 Rx, a Dual Pak and all connectors — all for $179.90. Specs: MIN-X RADIO, INC., 8714 Grand River, Detroit, Mich. 48204.

Monogram Models/Gulfhawk 2. Based on the Grumman F3F-1, Gulf Oil's Gulfhawk 2 was quite a demonstration aircraft. In exact 1/32 scale, the model is colorful in silver and orange. There are many working features: retracting gear, movable ailerons a detailed cockpit and Wright Cyclone engine. Authentic decals, wing sunburst and pilot included. Kit (PA184) is $2. At the same time Monogram is releasing a 1/32 version of the Navy Grumman F3F-3. All the full-scale realism is retained — working parts, correct markings, pilot figure, etc. Kit, PA186, costs $2. MONOGRAM MODELS, INC., 8601 Waukegan Rd., Morton Grove, Ill. 60053.

Edmund Scientific/New 1968 Catalog. The latest catalog, number 681, has just been released by Edmund Scientific. Well illustrated, its 148 pages cover all types of optical supplies, electric motors, gear assortments, surplus nickel-cadmium batteries, battery chargers, tools and switches. Four thousand items are included. It's free — just write: EDMUND SCIENTIFIC CO., 300 Edscorp Building, Barrington, New Jersey 08007.

L. M. Cox Mfg./Mini-Stunter. Weighing only three and a half ounces and molded from colorful, high impact plastic, the Mini-Stunter is a semi-scale bipe (Pitts Special) powered by the Cox Super .020. It requires little space — fly it and stunt it on 25 ft. lines. Engine features a spring starter, built-in fuel tank and a nylon prop for long wear. Complete with lines and handle, the price is $9.98. L. M. COX MFG., INC., P. O. Box 476, Santa Ana, Calif. 92702.

Orbit Electronics/Digital Propo Catalog. Orbit's new catalog was designed for the modeler. Specs for each Orbit Digital Guidance System are described clearly. There are photos of each piece, along with dimensions and weight of each airborne item; handy data when designing your own multi-ship. Ask for a free copy: ORBIT ELECTRONICS, 11601 Anabel Ave., Garden Grove, Calif. 92640.



Parts for the Monogram P-38 kit were nearly flash-free. The detail is well done. An excellent decal sheet was supplied, and the assembly drawings are easily understood.

Lockheed P-38J: "The Ace-Maker"

JOHN N. TOWNSLEY

MAJOR Richard I. Bong and Major Thomas B. McGuire won their places as the highest and second highest scoring aces of World War II, piloting P-38J's in the Pacific theater of war. Major Bong's final score was 40 victories and Major McGuire's, 38. Both pilots were accorded the Congressional Medal of Honor for their valor, Major McGuire's medal being presented posthumously. Clearly, the P-38 was an ace-maker!

Sleek and deadly, as dangerous as it was beautiful, this month's featured aircraft was known officially to the Army as the P-38. It was the last word in streamlining; embodying all the then-known principles of aerodynamics. Its unconventional design was chiefly visible in twin booms, which took the place of the customary fuselage, and added ruggedness and safety.

The pilot-gunner in this twin-engine, single-place plane rode in a bullet-like nacelle which was an integral part of the wing. All the cannon and machine guns were carried in the nose of the nacelle, directly in front of the pilot-gunner. The controls of this concentrated firepower were at his fingertips. The two slender nacelles, on either side of the pilot, each carried a 12-cylinder, liquid-cooled Allison engine with a combined total of 2,300 hp. The nacelles extended like torpedoes back to the twin-tails of the plane, and supplanted the conventional fuselage. The two three-bladed, controllable-pitch props rotated in opposite directions; giving the advantage of equal maneuverability to right or left, without torque effect.

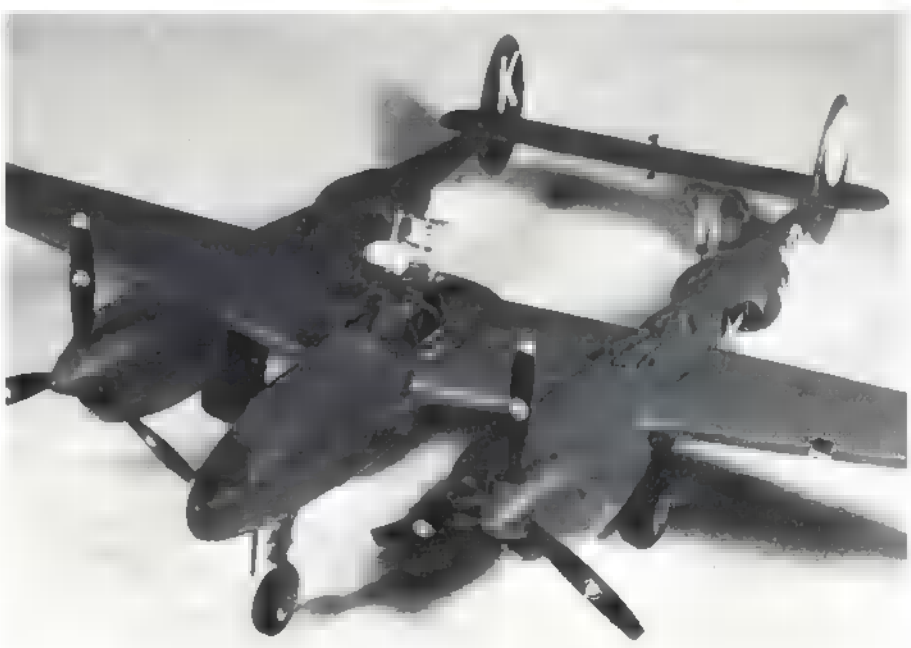
The gross weight was about 13,000 lbs. Part of the weight was armor for safeguarding the pilot and the vital aircraft parts. Additional weight was accounted for in the self-sealing fuel tanks, and much of its armament and equipment. However, the bulk of the weight was in the sturdy airframe construction.

Pilot armor included plates forward bulkhead, bottom and rear of seat, and above and behind the seat. Canopy consisted of two sliding side panels and rear-hinged, jettisonable top panels; optically flat, bullet-proof windscreen. Armament consisted of one 20mm. AN-M2 and four .50 caliber M-2 machine guns, all in the nose.

The basic lightning with no drop-tanks had a wider range than most fighters of this period and this range applied even when the aircraft carried a two-ton extra load of armament. The extra load could be bombs, tanks for laying smoke screens, equipment for delivery to ground forces, or additional gasoline for ferrying or extending the fighter range. Bombs and droppable tanks hung from the same special bracket under the aircraft's sturdy wing and were carried in any combination, such as one bomb and one large tank; droppable tanks of 150-gallon capacity were used for fighter or escort

Continued on page 48

Five versions of the P-38 may be built from this kit: P-38L, P-38J (model shown), P-38 night fighter, F-5B photo-reconnaissance and the Pathfinder. Scale is ¼".



MARCH 1968

model aviation

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RC club's planes steal show at NY coliseum

Squadron Escarole, Inc., one of New York City's more active RC clubs, [illegible] again — as it did in 1966 — highlighted the show at the second annual National Hobbies and Crafts Exposition [illegible] the Coliseum last October.

Finding themselves among 53 other exhibits ranging from plastic flowermaking to movie animation, and facing a sophisticated and largely indifferent audience whose most enthusiastic contingent seemed to be the little old ladies clustered around the knitting booth, squadron members efficiently swung into what has become, after only two years, a guaranteed-effective standard operating procedure:

Coliseum management had cooperatively located the squadron's exhibit [illegible] the entrance to [illegible] unused wing. This area was roped off and, at an opportune moment, club members carried in several of their most eye-catching planes and cranked the engines to life. Within seconds, a fascinated crowd stood ten-deep against the ropes as the gleaming planes taxied smartly around massive supporting pillars and then rolled crisply through a slalom-course marked out by large paper cups.

Children filtered magically through the crowd and soon constituted a goggle-eyed front rank. In the intervals of comparative silence when engines stalled or ran [illegible] of gas, audience members could be heard wondering when the planes would begin [illegible] fly. Squadron members circulated [illegible] the crowd's edge, explaining that there simply wasn't enough room to fly even the smallest RC plane, and distributing free hand-launched gliders to the kids.

As the crowd became restive, the squadron unlimbered a couple of tiny ready-built **Cox** ukie trainers (like the club originated, many years ago, [illegible] a U-Control group) and gave an exciting demonstration of mock combat. Volunteer kids were briefed on safety considerations and allowed — singly — to fly the planes. To everyone's surprise, the kids turned out to be deadcenter experts, sticking to conservative level flight in a very workmanlike manner.

Whenever the ukies were being refueled, club members launched a tiny built-on-the-page all balsa version of Walt Mooney's Pilatus Porter, carefully trimmed to be hand-launched at shoetop height, spiral tightly to within six inches of the ceiling and glide slowly down. As [illegible] of its success, the club [illegible] deluged with would-be buyers; everybody wanted to know where to buy "the kit that really flies," and several expressed disbelief and outright disappointment when told that no kit was available.

But [illegible] surprise all-time crowd-pleaser turned [illegible] [illegible] Jimmy Kokiadis' microfilm version [illegible] [illegible] **EZ-Bee**. Trimmed to fly a large circle around [illegible] [illegible] the pillars and to pass a few feet over the heads of the crowd's front rank, the plane's shuddering, snail-slow flight elicited exactly the same reaction [illegible] pass after pass; people's mouths simply fell [illegible] in total incredulity.

Meanwhile, back at the exhibit's tables, RC [illegible] were continuously being shown. Subject matter included the progression [illegible] a **Midwest Tri-Squire** from boxed kit through construction and the installation of **Kraft** proportional equipment, [illegible] its initial flight; vignettes [illegible] competition flying from many East Coast contests; a thrilling — and side-splitting — sequence [illegible] which a gorgeous, smoke-bomb-equipped **Aeromaster** flipped [illegible] its back [illegible] takeoff, was surrounded by frantic club members who disappeared in the smoke while frenziedly restarting the engine, and finally zoomed majestically all over the sky, trailing a splendid plume; and many, many Sunday Flying scenes of planes taking off and landing under every conceivable runway condition — dirt, grass, concrete, ice, snow and water. A running commentary kept the audience aware of what was going on, while other club members answered specific questions. RC system components and operation were demonstrated, and informational literature (over 4,000 AMA brochures and a club-written reprise of the variety, scope and meaning of the RC hobby) were distributed.

Approximately 12,000 people attended the Exposition, and nearly all spent most of their time [illegible] the RC exhibit, with the result that Squadron Escarole has been enthusiastically invited to participate again next year . . . this time with some hope of [illegible] cooperation from the RC industry. The club intends to continue to do its best to bring model aviation into the public view as a rewarding, exciting and meaningful field [illegible] endeavor.

New York Squadron Escarole members Jimmy Kokiadis and John Curtin demonstrate mock combat [illegible] with a couple of ready-built Cox plastic Control Line trainers. Photo by Charles Uht.

1967 RC Contest Board Chairman's Report

Much has been accomplished by your Radio Control Contest Board (RCCB) during the recent year. In this article is a discussion of what was voted on and a brief discussion on why the vote went the way it did. Discussion of the new RC supplemental rules is given, with the reasons for these rules and what they can do for RC.

It was agreed that engines no bigger than 10cc (0.6102 cubic inch) would be used in the pattern event. But in the scale event any combination of engines whose total displacement does not exceed 1.25 can be flown. The type of sanction for the meet does not matter.

The reasons for limiting the engine size in stunt (pattern) were safety, insurance costs, FAI engine limits, and the interests of the FAA.

Scale ships were allowed a larger engine because many of these models need the power to successfully fly in a safe manner. And there are not enough scale ships being flown for engine size safety considerations to be a major factor. The accident exposure rate just isn't high enough to worry about.

For many years the builder of the model rule has been the subject of many heated arguments. The introduction of almost-ready-to-fly aircraft has magnified this problem. It was decided to eliminate the builder of the model rule in the pattern event. The official statement is as follows: "the builder of the model rule will only apply to those events for which appearance and workmanship points are a factor. Scale and pylon racing events still require that the contestant build the model. However, in pylon a team entry is allowed with someone else to fly the model even if he did not take part in the construction effort."

Many meets have been sanctioned in error as AAA, where only RC events are flown. It is not possible to have an RC-only meet with a AAA sanction. A AAA meet has to have at least 8 events. An RC-only meet is simply a A or AA meet. It doesn't matter how many trophies or awards are given out. The ruling was made by the RCCB to leave the sanction classifications the way they have been listed in the rule book.

The RCCB also voted that only one pattern event can be entered at a meet. Very few people have competition ships for more than one pattern event. But a contestant can still enter more than one event at a meet, if they are basically different types, such as: pattern, scale, and pylon racing.

The RCCB considered the redefinition of the Novice-Expert classification. It was agreed to leave the definition alone because it is changed automatically in the new pattern event.

After many discussions and several ballots it was decided that the 1967 NMPRA (National Miniature Pylon Racing Assn.) rules (with minor modifications for safety and administrating the event) will be adopted for 1968. Meanwhile, the NMPRA is to determine a method to slow down the speed of the racers. If the NMPRA does not, then the RCCB will determine a suitable method. Deadline for the NMPRA speed reduction proposal will be June 1968.

The discussion of slowing the ships down resulted in many heated arguments. The decision of the RCCB to try and limit the speed somewhat met with strong opposition. However the final and official decision to let the NMPRA acting as the official AMA advisory group for pylon interests, to determine the speed reduction, has been received with favorable feelings. The RCCB also voted to continue the sq. inch pylon class on a provisional basis for 1968.

Another vote was the big one for most RC people because it affects the majority of the contest minded flyers. This concerns the complete revision of the pattern event. The previous Class I, II, and III categories are longer in effect. Basically, we have three pattern events, without restrictions in any as to radio number of controls. However, rules still provided for those who desire fly the old Class I and II types. These rules are now being determined by leading I and II fliers. These rules can be used sanctioned meets as optional events if the organizing group and contest director so wishes.

The new pattern classes called A, B, and C. This classification made to eliminate confusion with the old Class I and II events. Any type of aircraft with any control system can be used as long as it conforms to the general AMA rules (engine size, weight, FCC, etc.). It will be up the local CD to determine what classes will be flown. Advance notice must be given of the events to be flown.

A contestant shall enter any of the classes at his own option. Once a contestant has previously entered a class he will only be allowed to move to a higher skilled class and not down to lower class; class C being the higher skilled class. All contestants who have placed in competition prior to January 1, 1968 and have progressed to the former class III expert category will be required to enter the new class C expert category.

After a contestant has placed first in three sanctioned competitions in the A category he is required to enter class B at his next competition. After winning three times in class B (first place only) he will be required to enter class C Novice. After three first place wins in class C Novice he will progress to class C Expert.

The 1968 AMA rule book has the maneuver listings for the new classes. There are eight simple class A maneuvers; none of them with taxi requirements. Flight time will be 6 minutes, with two minutes of that time for starting engine. For class B there are eleven maneuvers, adding rolls, loops and an immelman turn, plus taxi requirements. Flight time will be 8 minutes, including two for starting.

For class C, eight basic maneuvers of class B are added to by ten more, the latter from list of seventeen maneuvers which selected by the contest director. The maneuvers are to be selected in a random manner just prior to the actual flying session. The maneuvers be reselected in a similar manner each day of the competition. Included are many from the FAI pattern (including Top Hat, Rolling Circle, Double Stall Turn, Horizontal Eight), plus several brand new maneuvers. Flight time will be 11 minutes, including two for starting engine.

An important change is in the taxi requirements. If the model does not taxi in a perfectly straight path, if the wind blows the model around a little, or if the ship wants to weather-vane, the model will not be down graded. This change will encourage two wheel geared aircraft and biplanes, which normally have difficult taxi characteristics.

The introduction of a new snap maneuver, knife edge flight, inverted and reverse spins, will cause some new design problems. It is hoped that the maneuver and taxi changes will bring out some new thinking to help eliminate the stereotyped designs we now have.

All of the FAI maneuvers are included in the list of maneuvers with the exception of the simple inverted straight flight. This will keep our future FAI RC teams in shape for the international competitions.

The selection of 10 maneuvers just prior to the flying will add some excitement to meets. This type of selection process is done at the full scale international aerobatic competitions. It is anticipated that the list of selected maneuvers will be expanded upon in the future, probably in time for 1969. The total number performed in a flight will remain the same unless the total time for flight is changed. An official judges guide is included in the rule book to clarify the various maneuvers.

Supplemental Rules. The present Class I and II categories have been eliminated. However the existing Class I and II ships can successfully accomplish all of the new class A and B maneuvers. The reason for eliminating Class I and II from the official pattern event is due to lack of entries at contests throughout the nation.

But the RCCB has approved the setting of set of supplemental rules for these two events. A national chairman has been appointed for each of these events, Jackie Gardner for Class I and J. R. Cox for Class

How the well prepared control line speed flier operates — models and gear stowed in special box. Seen at team selection finals, St. Louis, 1967. Famous pair: Roger Theobald, Bill Wisniewski.

II. They have formed committees with AMA district representation.

These committees are to make their own rules for each of their events. These rules need be sent to the RC contest board for approval of only the safety aspects of the event. The contest board will not decide on the various maneuvers, wing areas, etc. The RCCB is only interested if the event will work and if it is safe.

Note again that these rules and events are not required. They can be used if CD's want to use them. Will the new supplemental rules be in effect at the '68 Nats? No. But the committees can organize official competition at the Nats before or after official flying. The NMPRA did this at two Nats prior to the pylon racing event being accepted as an official event.

The supplemental events will have the support from the AMA via sanction privileges, insurance, rules listed in rule book (space permitting), and of Model Aviation in American Modeler magazine.

The purpose of establishing the provisional rules and appointing chairmen for each category is to put the promotion and responsibility of the event onto the group flying the event in competition. The provisional rule classes are events which have a lower percentage of competition flyers. It will be up to these groups to interest more people in their type of event. If the chairmen can show the RCCB that they have a group of competition fliers large enough to justify establishing their event as official, then the RCCB will follow up with action for change to official status and get involved with the problems of the event.

Additional events are expected to be set up on a provisional basis. Dale Willoughby has been appointed to form a nationwide committee for RC gliders. A provisional event will probably be established for gliders.

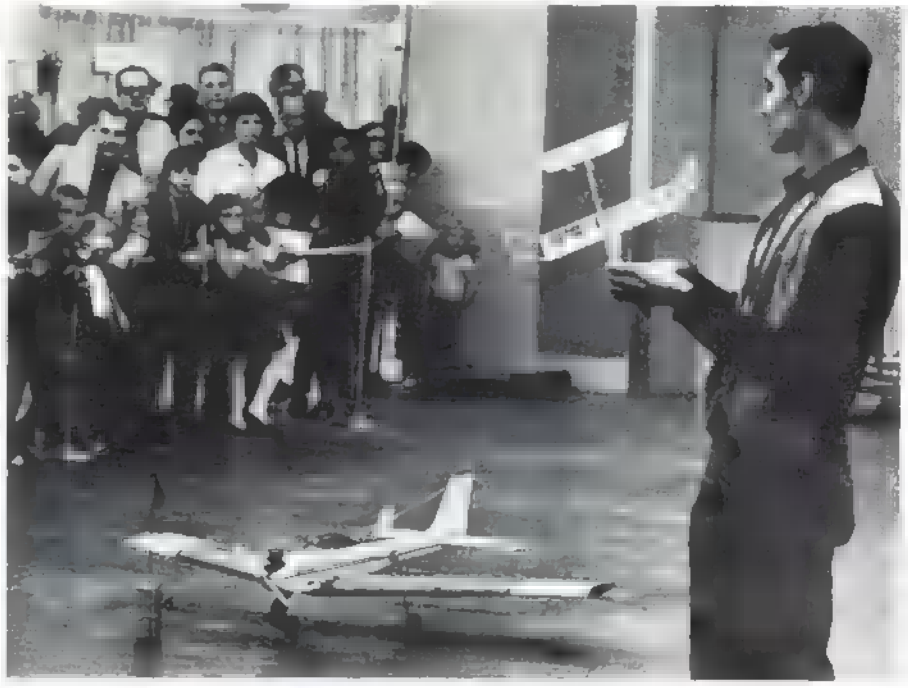
How to go about setting up an organization for a new rule event? Write people around the U. S. with similar interests. Get an informal organization set up and discuss problems and goals. A meeting at the Nats or the Toledo trade show is a good way to get things organized. Arrive a set of rules. Then submit them to the RC contest board chairman. He will discuss the proposal with you. If everything is in order the board will be asked to vote the merits of the proposal to see if it will qualify for a supplemental or provisional status. Don't expect something like this to happen overnight. Six months to a year probably would be in order. Deadline for the new rule books is a major time problem. This deadline is usually around the end of August.

If the new rules procedures work out successfully for Class I and II, and RC gliders, the scale and pattern event may be set up with a special chairman and organization to run their own activity. Basically we have this now with the pylon racing event and the NMPRA.

Thus the contest board act as executive council for RC. The contest board could be involved with the promotion of the hobby, safety, organizing contest procedures, team selections for internats, and other administrative duties. The actual engine sizes, maneuvers, wing areas, etc. for the various events could be left up to the various event committees.

That is the outlook for the RC activity. No doubt there will be a few minor problems that will come with the new changes. The rules are probably not perfect. No new set of rules can be. As you find things to change, let your local contest board member know. (See list on Officer Directory page).

Gerald Nelson, '67-'68 RCCB Chairman



Public demonstrations often operate wide variety of planes indoors. No problem with microfilm types but powered RC planes require precautions. Bud Tenny spells it out below. Photo by Charles Uht.

Safety aspects of operating model airplanes indoors

Indoor Models — Little hazard is attached operating rubber-powered indoor models, but indoor hand launched gliders be dangerous during the launch. Some HLG's "move out" nearly MPH during the launch. At the moment of launch a glider would have about 20 foot-pounds of energy. To say that another way, the impact would equal that of a one-pound object falling 20 feet. the glider has a pointed hardwood nose, a direct hit would apply over 1000 pounds per square inch pressure at the point of impact. A glider rapidly tames down, however — during the glide it would have less than 0.5 foot-pounds of impact. The need, therefore, is to control glider launch operations so that during the first second or so the surrounding the launcher is cleared.

Another potential hazard of indoor model flying involves retrieving of hung models. Gliders land on rafters, rubber models hang up; climbing into the rafters after them could result in a fall. Rafter climbing should be discouraged — it is prohibited at most meets. Normal model retrieving is done with long poles balloons — little hazard here unless hydrogen gas is used to inflate the balloon. Hydrogen gas is inflammable and explosive. Some buildings are heated (winter is a popular time for indoor flying) by gas heaters which have a pilot light going even the heater isn't operating. The of hydrogen should be prohibited — only helium gas should be permitted for balloon inflation.

Outdoor Models Flown Indoors — Occasionally, type of outdoor model may be flown indoors; most likely some small models powered by internal combustion engines (including Jetex). Several factors can combine to make this type of model airplane activity very dangerous. Three hazards present with internal combustion engines operated indoors, which there may be danger of injury to people.

First, all internal combustion engines produce noxious fumes which can cause respiratory poisoning, and the effect of some fuel ingredients is cumulative. That is, any damage done to the body does not repair and repeated exposure worsens the damage.

The second hazard is noise. The human can be damaged if certain levels of sound intensity are exceeded; hearing loss results. Measurements of sound levels for model airplane engines operated outside have approached these sound intensity levels, and indoor operation may greatly intensify the effective sound level.

The third and most serious aspect of operating outdoor models indoors is the impact force if the model goes out of control or if anyone steps into the path of the model. The following table illustrates the impact force of various models:

Model Type	Wt. (oz.)	MPH	Impact, ft. lbs.
.020 CL model	4	50	lbs.
½ A CL model	7	70	34 lbs.
Stunt CL model		60	350 lbs.
Combat CL model	18	120	540 lbs.
R/C Multi	96	60	700 lbs.
Pylon R/C	80	100	1100 lbs.

Remington quotes muzzle energy of about 150 ft. pounds for a .22 caliber long rifle many of our models should be respected quite dangerous! Indoors, if people have less to dodge and they are grouped closer together to fit into the building, the hazard may multiply.

Certain safeguards are essential to minithe hazards outlined above. Mufflers should be mandatory for gas engines. Prolonged operation of Jetex and glow plug engines, which will quickly foul the air of all but the largest buildings unless the ventilation system is adequate or unless large numbers of open doors and windows connect with the outside, should be avoided. A pull test for tethered and CL models (10 pounds or 25 G's, whichever is larger) is necessary for minimum safety. Additionally, a safety tether independent of the control system is recommended for CL models.

Continued next page

DIRECTORY OF AMA OFFICERS

Which officers live in your district? Select correct address when writing officers.

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Safety aspects

Continued from previous page

Small FF models have been flown indoors, as have special "indoor" RC models. A safety tether short enough to prevent the model from reaching any point of the spectator area should be used on FF and RC models. If an RC multi model is allowed to taxi under radio control [redacted] an indoor demonstration, not only is the muffler and safety tether imperative for this type of demonstration, the throttle must be positively locked into low speed. If possible, any demonstration of gas models operated indoors should have spectators behind a safety net or the demonstration should be conducted inside a cage strong enough [redacted] stop out-of-control models.

The relative danger of any particular model activity is greatly affected by the type of activity. A demonstration conducted by an expert flying a small, light model with all practical safeguards, is reasonably safe. Indoor competition, even between well-trained experts, can be very dangerous, since competition rather than safety tends to become most important. If any competitors are either young or inexperienced, the venture may be almost impossibly risky, unless tight control is exercised by adults.

The type of operation also affects the odds of having [redacted] accident. Tethered models with adequate pull test are reasonably safe as long as spectators are kept under strict control (preferably behind a shield) and if model fliers not actually flying are also kept well back from the action.

CL models are more dangerous, even with adequate pull test, simply because they [redacted] anchored by a flier who could release the handle. For this reason, a tether independent of the control system should be used as a minimum safeguard. An engine cutoff and a cage around the flight circle are strongly recommended also.

RC models, even the ultra-light "special" models sometimes flown indoors, may be dangerous for reasons of their own. First, the radio gear can malfunction and let the model free flight. Second, due to any number of reasons from poor lighting, poor eyesight or depth perception, [redacted] just plain poor flying or poor judgement, the model [redacted] function properly and still hit something [redacted]

Free Flight outdoor models, depending upon size or type, vary in difficulty to make safe if operated indoors. Free flight gas models have been flown indoors, but this should not be attempted without safety tether and engine cut-off for minimum safety.

As should be obvious from the impact chart above, the heavier and faster the model is, the greater the damage to people and things when they hit. A handy rule-of-thumb to estimate the danger is this: Multiply the model speed in miles per hour by the model weight in ounces. If this product exceeds 100, seriously consider whether [redacted] other activity would not be preferable. This product should not exceed 150 for indoor flying, unless you take all possible precautions applicable to the model type. For example: 4 ounces model and 30 mph speed — the product is 120 and the impact energy is about 8 ft. pounds.

In summary, some types of models are much less safe to fly indoors than others. Engine powered models, in particular, should not be flown indoors unless special and effective safety precautions are applied. But in any case it is more a matter of how the flying is conducted than what is flown, with emphasis on responsible and concerned supervision to minimize hazards.

CONTEST CALENDAR

Official Sanctioned Contests of the Academy of Model Aeronautics

Jan. 26 — Wheaton, MD. D.C. Maxecuter Indoor Record Trials Cat. I. Site: John F. Kennedy H. S. Gym. T. Vallee CD, 444 Henryton, So. Laurel, Md. [redacted]

Jan. 28 — Fresno, Calif. (A) Fresno Monthly FF Meet. Site: Near Kerman. F. Gallo CD, 1725 Kenmore Dr. W., Fresno, Calif. 93702.

Feb. 10-11 — Green Bay, Wisc. (AA) I.C. Winter Jamboree for FF [redacted] RC. Site: Bay Beach. R. Cowles CD, 2424 Ducharme Lane, Green Bay, Wis. 54301.

Feb. 17-18 — Buckeye, Ariz. (AAA) 18th Annual Southwestern Regional Model Airplane Contest for FF, CL & RC. Site: Airport. Q. Webster CD, 3318 E. Sheridan, Phoenix, Ariz. 85012.

Feb. 18 — Lincoln Park, N. J. (AA) 8th Annual Snowbird Challenge Meet for CL. Site: G. S. C. B. Club Field. A. Cangialosi CD, 131 Horseneck Rd., Fairfield, N. J. 07006.

Feb. 24-25 — Sebring, Fla. (AAA) P. B. Aircadets Model Meet for FF, CL. Site: Airport. A. Bursey CD, 2336 Redwood Rd., W. Palm Beach, Fla. 33401.

Feb. 25 — Fresno, Calif. (A) Fresno Monthly FF Meet. Site: Near Kerman. F. Gallo CD, 1725 Kenmore Dr. W., Fresno, Calif. 93702.

March 9-10 — Los Angeles, Calif. (AA) B. I. R. D. S. Open RC Meet. Site: BIRDS Field. J. Bridi CD, 23625 Pineforest Lane, Harbor City, Calif. 90502.

March 30-31 — Pittsburgh, Pa. (AA) 4th Annual Allegheny Indoor Air Meet Cat. III. Site: Pitt Univ. Field House. R. Pennetti Jr. CD, 3918 Brandon Rd., Pittsburgh, Pa. 15212.

March 31 — Fresno, Calif. (A) Fresno Monthly FF Meet. Site: Near Kerman. F. Gallo CD, 1725 Kenmore Dr. W., Fresno, Calif. 93702.

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Messerschmitt Bf 110 1/72 Scale • $1.00

This German-built fighter of which more than 6000 were built before the end of World War II was christened "Zerstorer" (Destroyer) in Germany. It was designed to clear a path for Luftwaffe bombers to and from targets deep ■ enemy country. First flight was in May, 1936. The model is a sleek and exact copy in amazing detail. Clear Canopy, two-man crew in authentic German flying suits, machine guns, four 110 pound bombs and two 1100 pound bombs and full color decal sheet. Props and wheels revolve. Model can be assembled with landing gear in up ■ down position.

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The famous P-47 made more aces, shot down more enemy planes, than any similar aircraft in World War II. It could fly higher, faster and farther and carry more guns and other protection than any other airplane had done. Model ■ an exact quarter inch copy (1/48 scale), with sliding canopy, detailed cowl, engine and interior. Instrument panel, rudder bar, stick and pilot included. Gun sight molded on fuselage. Huge drop tank on underside. Eight machine guns molded ■■ wings and two 500 pound bombs mounted on wing pylons. Four-bladed prop. Decal markings copied from plane flown by Lt. Col. Francis S. Gabreski, highest scoring ace in E.T.O. R.A.F. Markings also included.

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1/48 scale—$1.00 to $2.00. Thunderbolt P-47D—Mustang P-51B—OS2U-3 Kingfisher—Mosquito—Combat Helicopter—Rescue Helicopter—Fw190 Focke Wulf—T-28D Viet Nam Fighter—P-40B Tiger Shark—Hawker Hurricane—Japanese Zero—Bf109 Messerschmitt—British Spitfire—F4 F Wildcat—F4U-4 Corsair—F6F Hellcat—SB2C Helldiver—SBD Dauntless—TBF Avenger—P-38 Lightning.

Made Exclusively by Monogram Models, Inc., Morton Grove, Illinois.

P-38J Ace-Maker

Continued from page 42

missions and gave the P-38 an effective combat range of 750 miles.

Without this extra load, the P-38 could climb to more than 30,000' and fly well over 450 mph; yet it maneuvered effectively against fighters with half its unusually heavy wing-loading of 48 lbs. per sq. ft. This incredible range in performance (incredible for wartime years), was achieved by the quick acting maneuvering flap which greatly increased the lift of the wing with almost no effect on its drag. The flap could be lowered in three seconds and raised in four. The same flap shortened the takeoff run, especially in mud or snow. The aircraft could operate from small airfields which were formerly closed to fast aircraft.

The P-38's were in great demand in the Pacific theater of war due to their long range capability; ideal for escort missions with Army bomber formations over vast expanses of ocean. The following groups of the Ninth USAAF flew the P-38's in the Pacific area: 369th Fighter Group; 370th Fighter Group, and the 474th Fighter Group.

Specifications: Manufacturer: Lockheed Aircraft Corp. Company model or designation: 222, 322, 422. Army designation: P-38. Name of plane: Lightning. Type: Military fighter. Crew: one. Powerplant: two engines — Allison V-1710 F2 liquid cooled inline; rated horsepower: 2300 (1500 per engine); propeller (make): Curtiss Constant Speed, full feathering, diameter: 11', 6" (three blades). Performance: High speed 400-450 mph class. Weight: Gross weight, 13,500 lbs. Dimensions: Span 52', length overall 37', 9 15/16", height overall 9', 10 1/4". Landing gear: Tricycle type, retractable. Armament: Four machine guns, one cannon. Superchargers: Two turbo superchargers.

Products used: Monogram is to be complimented on their kit used in article. It is without a doubt the best kit produced to date by this manufacturer. The clarity of the assembly drawing; the almost totally flash-free precision parts; excellent matt-finish decal sheet; and the choice of five versions of the aircraft: P-38L, P-38J, P-38 night fighter, F-5B photo-reconnaissance, and Pathfinder, all add up to an excellent kit. The kit number is PA #97, retailing at $2 and is in 1/4" scale.

All spraying was done with a Badger No. 200 airbrush; Pactra paints and thinner; Testor's liquid cement; 3M wet or dry; Trend liquid detergent; Duratite and Duco Auto Spot Putty were used.

Preliminary procedures: Check kit for broken or missing parts. Make a test assembly of parts without using cement to make sure that all parts fit smoothly. If not a good fit, file to correct. Dunk parts in warm detergent suds, scrubbing lightly with toothbrush to remove any mold release. It is very easy to lose some of the small parts. The safest way to guard against loss, is to place the parts in a fine mesh kitchen strainer while dunking in the suds and rinsing. File or sand mold lines from parts after air drying thoroughly after washing.

Color Scheme: Undersurfaces: Medium gray. Uppersurfaces: Olive drab.

Painting of small parts: After assembling according to kit directions, spray propeller flat black with yellow tips; spinners: olive drab; wheel centers: flat aluminum; tires: flat black to which you have added a small amount of flat white to simulate color of rubber tire. Paint canopy frame olive drab, wing tanks: undersurface color (neutral gray #43); turbo-superchargers olive drab (#41); interior of all doors: zinc chromate

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Eleven Hours of Luck

Continued from page 26

final design turned out to be simple and light. It was made from a cut-down 6 oz. plastic bottle for the reservoir with a metal lid that would just fit the inside diameter of the bottle. The lid was held in by three screws around the outside edge. Through the center of the lid, [illegible] soldered a piece of 1/8" brass tubing extending 1/2" inside and 1" outside. This tube had a 3/4" piece of neoprene tubing attached on the inside. The float was a cork with a piece of .032 music wire stuck in the top. This rode inside the brass tubing and a blob of solder [illegible] the wire would close off the neoprene tubing when the float reached the proper level.

The first test flight was made on Oct. 16, 1966, with just an 8-oz. clunk tank stuck in between the rubber bands on top of the wing. The ship handled like a dream, but didn't prove anything, [illegible] it weighed only 4 lbs. 2 [illegible] at this point. The Enya with a 14-6 would take the ship up to about 4000' in less than a half hour.

The following Wednesday, Red called [illegible] and said he and Gordon Pearson were going to make an attempt on the next Saturday; could I make it? I told him I would try. I still didn't have a tank and didn't have time to experiment with a plastic for vacuum forming that would hold up in the fuel or even find out if I could get off with a full load of fuel. I switched to a [illegible] .45, as I knew this would have the power to get the ship up there. For a tank, I would use a plastic gallon fuel jug strapped on top of the wing. I had to have some new fuel, and I knew nothing about fuels. I went back and reread Maynard Hill's article; decided to try his mixture. It worked so well, I was amazed. I ran tests in my garage (to keep the noise down) on the engine Wednesday and Thursday nights. Friday night, I flew two hours with the K&B .45 and gas mix; it worked. I called Red that night and we agreed to try for a [illegible] a.m. takeoff.

Saturday, Oct. 22, I was up at 4 a.m. calling my crew: Paul Secan, Bill Laubengayer and Al Olada. By 5:30 we were at the field. Red was delayed until 7:00. We couldn't do anything until he got there, as he had the scales to weigh in with.

Red and Gordon were in the air in short order. They had followed my lead and installed diesels in their ships while I had gone backward, and was using glow. After weighing, fueling, and reweighing, I tried to start the K&B only to find my starting battery dead. We tapped one cell on the car battery and got started. Everything seemed all right and the .45 pulled the ship with a full gallon of fuel like a skyrocket. I let it climb to about 1,000' and throttle back — then the trouble started. The engine started to get rich and the ship started down; high throttled again, and it didn't help. The wind was now gusting about 15 mph and [illegible] landing, the wind caught the Mystic and turned it upside down. We all thought that the wing had had it. The geodetic construction paid off, as she just bounced on the wing like a rubber ball. Upon inspection, we found only a couple of spar cross-members knocked loose.

Why had the engine suddenly gone so rich? A hurried job on a fuel filter had been done the night before. This had been sealed with Selastic rubber, which didn't have sufficient time to cure. A strip of this rubber had gone down into the float chamber and caused it to stick, flooding the engine.

The float chamber was cleaned, filter removed, ship refueled and reweighed for another attempt. Now the engine would not keep running. I added propolene oxide to the fuel to help the ignition. This worked, only [illegible] the K&B was running too hot from lack of oil. One thing led to another and pretty soon it was too late to make an attempt; it would be dark before the record could be broken.

Both Red and Gordon were having trouble with their engines and had to come down after [illegible] hour or two on several different attempts.

During the winter, I built a tank of balsa that would attach to the wing. It looked like a cabin sitting between the wing and fuselage. The tank was lined with drafting vellum and coated with epoxy. This tank would hold a gallon of fuel and added only 3 oz. to the weight. About this time, I was able to obtain a Super Tigre .15 RC diesel and tests showed it would turn 4000 rpm on the 14-6 at almost the same fuel consumption as the Enya. This extra rpm would help on the takeoff and the Tigre throttled down to about 1,000 rpm without ever missing a beat. I couldn't have asked for more.

I started to experiment with diesel fuel and tried many different combinations before coming up with the final mix. This fuel was 20% Ucon oil, 40% ether and 40% kerosene. I used the Ucon oil instead of castor oil because it does burn; this, in a small way, contributes to the power and makes for a cleaner ship. I think a good, clean, all-around diesel fuel would be 25% Ucon 37 1/2% ether, 37 1/2% kerosene.

Now everything was ready. All we had to do [illegible] wait for spring and good weather. In April, I made a test flight and everything went fine. On the test flight, I used an 8-oz. plastic tank tied on top of the wing, in order to keep the main tank clean. We had set April 22nd as our first attempt, but had to cancel as the wind was up to about 25 mph; much too high for a ship of this type.

The next attempt was set for May 6. On the Wednesday before, I decided to try the ship with a full load. I still flew using the 8-oz. tank above the wing, but filled the main tank with water. This was intended to keep the tank clean and would weigh about a pound more than the fuel. The water kept the tank clean, along with the radio and servos. After an hour flight, I brought the Mystic down and found the tank had leaked. There was a half inch of water in the fuselage and the receiver was half covered. I still find it hard to believe that the receiver was still working; maybe I should try a submarine.

I [illegible] convinced the extra few ounces for a brass tank were well worth the safety of not having a repeat of that flood. A brass liner [illegible] made and installed inside the wooden structure at a cost of 4 ozs.

On Saturday, May 6, we were all at the field at [illegible] a.m. The plane was weighed, fueled, reweighed and in the air at about 7:30. The flight ended after seven hrs. 59 mins. I had spiraled down from about 4,000', and the engine quit about ten minutes later. It was assumed that the fuel feedline had lost its prime, as fuel went to the front during the spiral, and the fuel line to the float chamber was high in the front of the fuselage. A new feedline was made so that I was sure flow was down-hill all the way.

On Saturday, May 13, 1967, I was up again at 4:30 a.m. calling the crew. We were at the field at 5:45 weighing in; the empty weight [illegible] 5 lbs. even. I decided to carry the same fuel as the week before (3 quarts), because I had had a quart left in the tank after eight hrs. The fuel consumpton goes down as the ship gets lighter, requiring less power.

I hand launched the Mystic at 6:21 a.m. The Super Tigre was turning a 12-6 at

6,000 rpm and she climbed out beautifully at 10 lbs. 2 oz. The sun was shining, and the sky was full of small clouds at about 10,000'. This meant a lot of thermal activity when it got a little warmer. After about five minutes, I had to throttle back as the ship was already getting too high. About 9 a.m., the sky started to clear; by 10, there wasn't a cloud in the sky. I couldn't have had a better day, as this meant I wouldn't have to fight the up and down drafts. I could relax on the chaise lounge and occasionally make a correction. About 11 o'clock I wanted more down trim and found I was already in full down. At this point, I assumed the elevator had slipped out of the saddle; but after the flight was over, we found I just didn't have enough down elevator. This problem never amounted to anything, as the wind never got up to more than about 10 to 12 mph; but it could have been a real problem.

I can't say that anything else unusual happened on the whole flight. She just flew and flew until at about 5:34 p.m., the Super Tigre ran out of fuel. The airplane was about 200' in the air. I made one pass down the field; turned around and landed. The touchdown was at 5:38 (only 16' from the point of the takeoff) 11 hrs. 17 min. and 47 seconds later. (I'll bet I get more flying time in one day then a lot of you fellows do in ■ month.) Upon examining the ship, a pint of fuel still remained; enough for at least another couple of hours. The fuel filter was plugged, causing the engine to quit.

All the equipment used was strictly stock. The only changes being that of adding MonoKote to the servos to make them have broad neutrals. The Min-X was a set that had been used for several years, prior to being installed in my ship.

I wish to take this opportunity to thank my wife (Shirley), Red Gunning, Paul Secan, Bill Laubengayer, Clyde Atkinson, Jack Steele, Don Gaskell, Tom Bell, Tom Byrnes, Maynard Hill, The Indian City Radio Control Club, Min-X, Super Tigre, Controlaire, Top Flite, Sig and many others who in some way contributed to my being able to set this record.

Curtiss Falcon

Continued from page 29

an "O" designation. Curtiss was given XO-1, Douglas XO-2, Wright XO-3, Martin XO-4, etc. (The Wright entry, failing to meet the deadline, was entered in the ■ competition along with several others that could not be completed in time.) Douglas won the competition readily and received a contract for 46 O-2 aircraft.

It appears that the initial trials did not produce all that the Air Corps wanted; a second competition was held in early 1925, for Packard 1A-1500 in-lined 510-hp versions. Both Curtiss and Douglas groomed their original X-ships for another ■ round. The Packard engine, though of greater horsepower, was little more than a glorified Liberty and its heavy weight and troublesome temperament in relation to output made it necessary to reevaluate the engine-to-airframe concept.

The Curtiss organization was anxious ■ promote their own engine in the observation aircraft for obvious reasons. The Curtiss V-1150 (D-12) engine of 435 hp was installed in the XO-1 and demonstrated. Performance was not as good ■ the more powerful Packard-engined version but it was lighter in weight, easier to handle, more reliable and provided a far greater range of operation. This latter feature was essential to the observation role.

Continued on page 52

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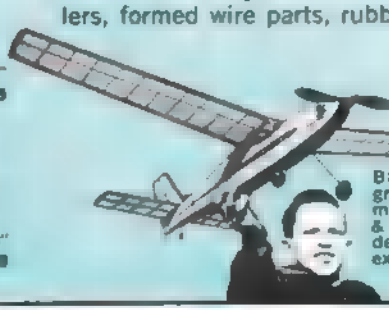

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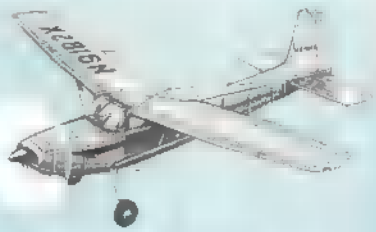

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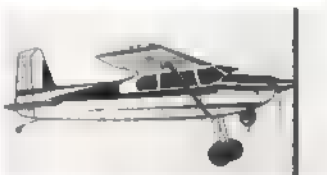

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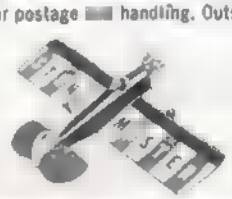

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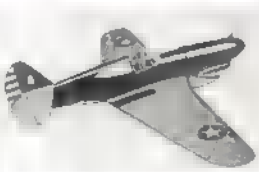

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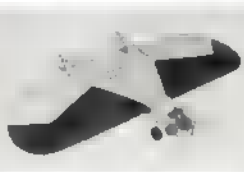

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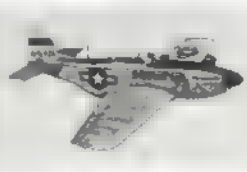

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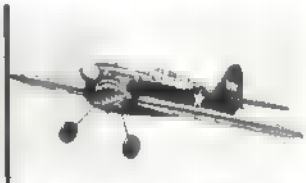

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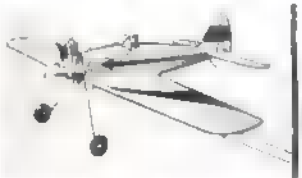

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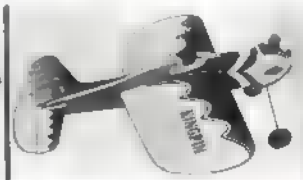

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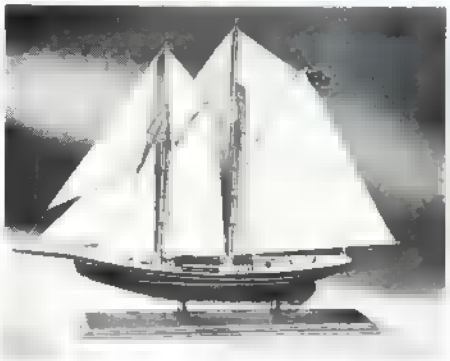

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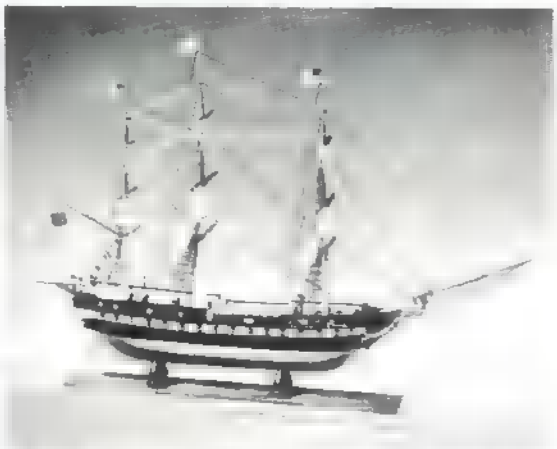

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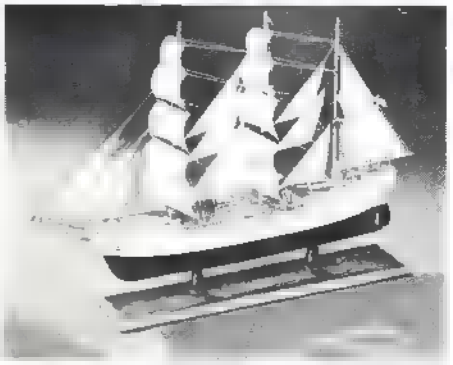

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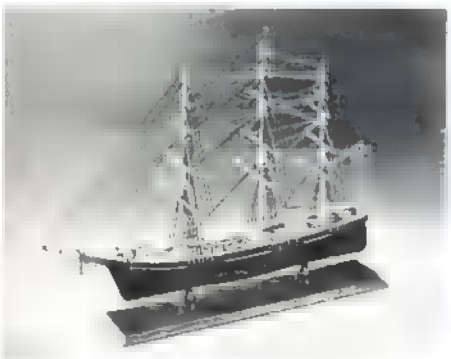

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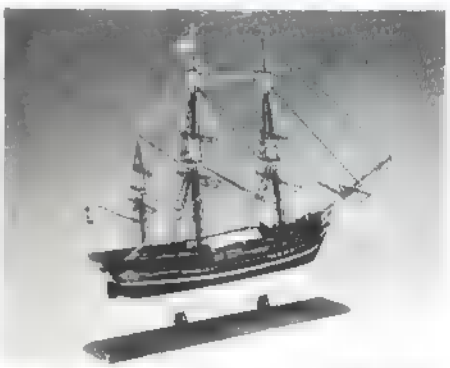

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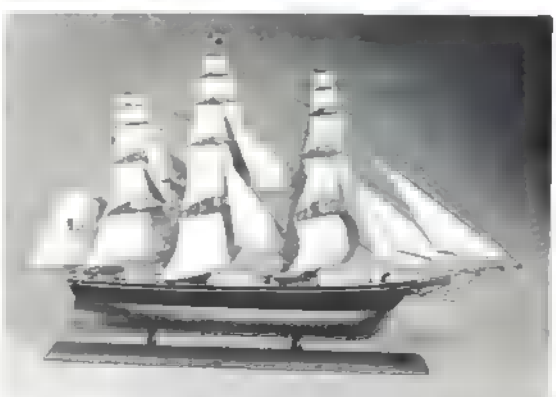

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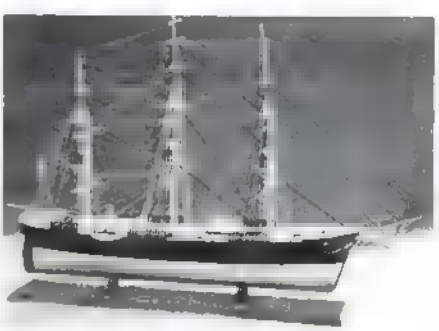

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The D-12 powered Falcons earned an initial ten plane contract as O-1 models. An interesting and fierce competition between the Curtiss O-1 series and the Douglas O-2 line followed. For the most part, Douglas was able to do everything required by the military with the 400-hp Liberty in their O-2s; they stayed abreast and in many instances even surpassed Curtiss who used the D-12 exclusively in the O-1 series (except the two O-1As). Curtiss built 104, O-1 types (O-1 through O-1G), not including the sole XO-1. Douglas produced 241 of the O-2 models (O-2 through O-2K).

The series of observation craft produced by Curtiss following its O-1 series was for the part, one-of-a-kind experimental types. Only the O-11 and O-39 models received a contract, and these were for a limited number. All were tagged by the company Falcons. This was not an official nickname of the military but rather a Curtiss trademark. Of the eight experimental Falcons produced for the Air Corps, most were modified to evaluate a new or different engine a new cooling system for the ever troublesome, liquid-cooled engine. In this respect, one Falcon became a guinea pig of significant importance.

The XO-16 a Curtiss O-11 with an experimental, ethylene glycol coolant used instead of water. A Curtiss V-1570 600-hp Conqueror engine installed and a series of valuable tests carried out. Many of the problems with water-cooled engines were overcome with the development of glycol, commercially known as Prestone. With its high boiling point, low freezing point and excellent heat transfer properties, it gave liquid-cooled engine a new lease on life. The XO-16 had a smaller radiator, 50% less frontal area, allowing better streamlining and provided better performance throughout the power curve and at all altitudes. This played important part in the liquid-cooled engines employed in the succeeding years and through WWII.

While the Falcons were originally built for the observation role, the basic design was readily adaptable to various other roles. They were easy to fly, being somewhat docile in the air, maneuverable enough, rugged and reliable machines. Mechanics had few complaints in keeping them airworthy. Some of the good flying characteristics can be attributed to the judicious of the, then new, Clark Y airfoil. A negative incidence angle was built in, similar to the Curtiss Hawk pursuit machines. The Clark airfoil is a good all-round section, not necessarily designed for speed or high lift but with careful engineering it can serve both purposes a happy medium. Obtained with the Falcon was a reasonable top speed of 140/145 mph, a low landing speed of 55/60 mph, complete balance in all axes of flight and the capability of carrying over 1,500 lbs. of payload.

Under the new attack category, the Army began to search. Exact needs were not fully assessed; it decided in July 1926 to utilize the O-1 Falcon series, modified with added armament, as a substitute until a more satisfactory type could be developed. In its new role it served very well. Two forward firing guns were added in the low- wing's leading edge — just outboard of the propeller arc. This provided four guns forward including two under the engine cowl that were synchronized to fire through the propeller arc. All were .30 caliber Brownings. Two flexible .30 Lewis guns were retained on the aft cockpit Scarff mount. On February 28, 1927 a contract was awarded for 76 Falcons as A-3 attack models. These were the first attack type aircraft approved for large scale production.

In five of the A-3s were reworked for as transition trainers. The rear

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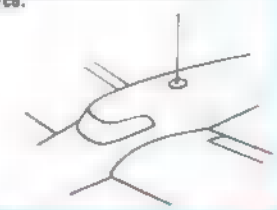

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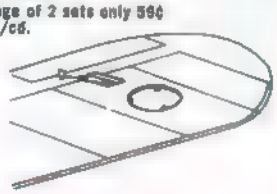

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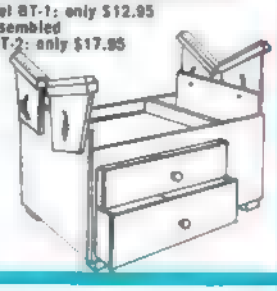

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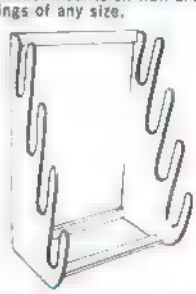

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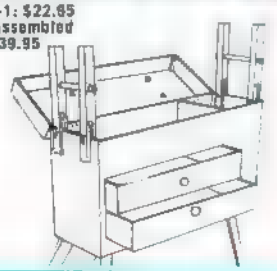

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cockpit was stripped of armament and fitted with a complete complement of instruments and flight controls. The designation was not changed to indicate trainer or put them into this symbol category. The five aircraft were simply A-3A models. The main purpose was simply to indoctrinate already proficient pilots in the tactics of attack aviation, especially low level strafing and bombing runs.

While it is generally assumed the major production of Falcons served the observation role, the greatest number by count was built as attack aircraft. Most popular and acceptable version of the series was the A-3B model. Orders were placed for [illegible] of these in June 1929 and March 1930. This totals to [illegible] "A" types versus 119 "O" types. The first was tested in April 1930. These were basically the same as the previous A-3s but with [illegible] improved 435-hp V-1150-5 (D-12D) engine, Frize-type balanced ailerons for easier lateral control and [illegible] steerable tail wheel replacing the time-honored tail skid. Extra equipment and beefing-up various areas added a few extra pounds. As a consequence, performance [illegible] not quite [illegible] good [illegible] the A-3 version.

The Falcons were not the complete answer in attack-type aircraft, [illegible] for their day; but until the advent of the low-wing all-metal types could be developed, the A-3s [illegible] successful enough to remain in service until 1934. An attempt was made to modernize [illegible] Falcon A-3 by the installation of [illegible] air-cooled Pratt & Whitney R-1340 radial engine of 410 hp. Maintenance-wise it was easier to service, but the performance was about equal to that of the A-3B already in quantity use. This was the XA-4 Falcon. Its evaluation got no further than [illegible] series of routine tests before it was modified back to an A-3.

The Air Corps was not quite ready to

abandon the liquid-cooled engine; the newer monoplane attack craft were too far along in development to pursue the biplane Falcon line further. The capability of the Falcons to perform a multi-purpose role, though somewhat mediocre in certain categories, led the Marine Corps to look into its potential to serve their needs, carrying out duties in brush and guerrilla warfare. During the late 1920's they were called upon to suppress a number of uprisings in Haiti and Nicaragua. The Army's A-3 series, capable of low level attacks with sufficient forward fire power, carrying small fragmentation bombs and able to sustain long reconnaissance flights, appeared suitable.

The Navy ordered six Falcons based on the A-3 type in 1928 but powered with — the Navy's choice — the air-cooled P&W R-1340 Wasp. The machines were essentially the same as the Army's XA-4. The Navy tested the first two prototypes as F8C-1 fighters but performance was so inferior for this role that by the time all six were delivered and turned over to the Marine Corps the designation and role assignment had been changed to OC-1, observation.

An additional 21 were ordered and delivered to the Marine Corps as F8C-3s. These were identical to the F8C-1 models with added armament similar to the Army's A-3Bs. It is doubtful that the fighter designations were ever applied to the aircraft themselves inasmuch as earlier F8C-1s proved failures. The aircraft were delivered to the Marines as OC-2 models. They used their Falcons to the fullest. Many tactics and insurgent counteractions were worked out with the OC-1/-2s. The main duty of the Marine air arm has always been close support of their ground troops. The Falcons proved to be their first, up-to-date aircraft capable of carrying out such a

mission since the discard of the DH-4s.

The Curtiss line did not die upon delivery of the last military Falcons (ten Army 0-39s in 1932). In 1929 the Buffalo plant produced 12 mail plane versions, 11 for NAT (National Air Transport) and one for the Post Office Department. Powered with geared Conqueror engines and featuring a deep belly for added mail/cargo space, they were used by the airline [redacted] the mid-western routes for nearly four years.

One special Falcon was produced in 1930 for Pan American Airways for use on their South American subsidiary, Pan American-Grace Airways routes. This was built according to PAA specifications as [redacted] special high-altitude mail plane, powered by the Wright Cyclone air-cooled engine. It gave excellent performance, surmounting the highest peaks of the Andes with over [redacted] lbs. of payload.

Curtiss also offered the Falcon for private use but found no buyers. In 1930 the liquid-cooled, Conqueror-powered demonstrator, license 310E, was flown about the country, but the upkeep on such a machine was too much for the buying public at the time.

The last of the biplane Falcon line was produced in September 1934. Built at Buffalo, it was [redacted] highly modified, dressed-up version, sporting civil license X-14369. Under the skin was the old Falcon structure, but externally, it featured a fully enclosed sliding cockpit canopy that faired into [redacted] turtle deck, a plush interior, and a fully cowled Wright Cyclone engine driving [redacted] a three-blade metal propeller. It also featured a faired, single strut landing gear with streamlined wheel spats similar to the familiar P-6E design. It was shown in the United States, South America and the Orient but the basic type had pretty well run its course; [redacted] buyers were found.

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Hi-Rate compatible with Rand Dual Pack and Lo-Rate compatible with Rand GG Pack or other GG actuators. Switch selects either pulse rate. Complete transmitter power supplied by inexpensive long life 6 volt dry battery or 5 cell nicad pack.

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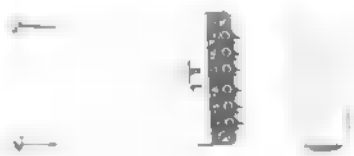

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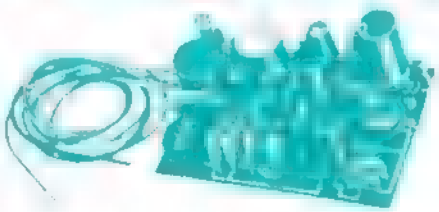
The modeler can buy cheaper single channel equipment, but none better than F & M.
The **Royal Electronics** line-up for 1968 of F & M single channel equipment is presented this month. Watch this space next month for [illegible] exciting new products.



The GG-1 [illegible] Transistorized Transmitter $59.95

Pioneer [illegible] uper Regene[illegible] Re-ceiver $18.95

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[illegible] ments [illegible] GG [illegible] $29.95
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Saturn [illegible] [illegible], with relay ..... $[illegible]

[illegible] Single [illegible] Trans- [illegible] $29.95

Factory Direct only
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Royal Electronics Corporation

Box [illegible] — [illegible] South [illegible]
[illegible], Colorado [illegible]

[illegible] Modelers write [illegible]

Smithsonian

Continued from page 21

sources in a typical year. The Smithsonian, contrary to what many people believe, does not have a crew of elves whose only function is to turn out beautiful scale models.

Because the [illegible] of quality models is limited, Mr. Casey views the more detailed scale and semi-scale craft at meets around the country with professional interest. These builders, these perfectionists who take the care to hand-stitch a leather seat and paint their own insignia (neatly) — these are the people he wants as potential suppliers. The Smithsonian, as everyone else, has trouble finding enough talent.

How does the Air Museum procure a model? First, there is a need — to complete a specific exhibit, to typify an era, to display a rare or unusual type. The Museum then draws upon its extensive library of prime [illegible] material — original manufacturer's drawings, purchase specifications, photographs, flight logs and reports of all kinds. Pertinent, accurate sources are noted; conflicts in data are resolved. Here, the curator's special talent comes into play, sifting and weighing until he has an accurate mental picture of the aircraft under consideration.

Next come three-view drawings by a commercial contractor, accurately delineating all dimensions, markings, and required detail. Then, a prospective builder is selected with conferences on construction details and negotiation of a price. This may run $500 to $700 or more, depending upon the complexity of the model. Months may pass while construction is underway — the Smithsonian is primarily concerned with accuracy not speed. When finished, the modeler builds a double-walled, wood container and ships in the masterpiece. The curator inspects the model and if up to museum standards, authorizes payment.

Currently, emphasis is placed upon model permanence. In recent years, the Museum specified the use of modern materials and construction techniques which, hopefully, will prevent deterioration. Nylon is replacing silk, polyesters replacing wood. Welded brass framework is used instead of basswood and patternmaker's pine. After years of sad experience, Mr. Casey has concluded that wood will always shrink, given enough time and regardless of seasoning. Hopefully, the so-called

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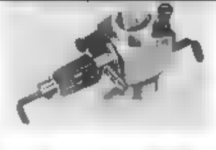
Model Trains, Planes, Ships, Cars, R/C, Everything!



THE [redacted] CUSTOM R/C CARBURETOR $9.95

Designed to maintain proper fuel-air mixture at all throttle settings. Provides automatic control for both fuel and [redacted]ing the engine, resulting in increased power, improved response and optimum fuel mixture at all RPM. Does [redacted] go "rich" [redacted] load the engine with [redacted] at low power settings. You get dependable idling without stalling.

AVAILABLE [redacted] ENGINES

O.S. Max 19, 30, 40, 50, 58, 60 / Merco 35, 49, 61 / Super Tigre G 21/29-46, 51 [redacted], 60, G 60, G 60 FI / Enya 45, 60 / Rossi 60 / Veco 35, 45, 61 / K [redacted] B (front) 40, (rear) 40, 45 / [redacted] 60. / Indicate engine and displacement when ordering. Also excellent for U-Control Engines.

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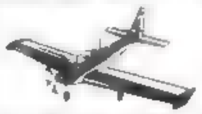
Kavan GLOW PLUG CLIP $1.59

The calculated resistance of this 37" wire permits the use of 2.2 volt Aristo-Craft Wet Cells or other wet cells without fear of burning out glow plugs. Connects to any standard glow plug with snug fit for perfect electrical and vibration-free contact, yet it disconnects easily. The phosphor bronze contacts [redacted] the neoprene [redacted] are [redacted] adjusting, permitting perfect contact even on non-standard glow plugs.

SCHUCO R/C PLANE KIT [redacted]



"Pioneer" model for multichannel operation. Plastic fuselage, ready planked Styropor wings, with built-in leading and trailing edges and gear mount and steerable nose gear with nylon bearings. Wingspan approx. 64½"

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Starter Spring .074 engines	45¢
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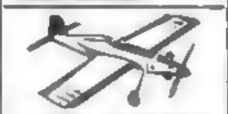
Compensator, automatic co-pilot. Prevents over-control	98¢



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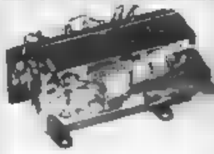

ARISTO-MATIC MARK II [redacted] ACTUATOR $13.95

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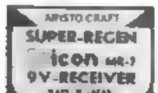
46¼" Molded cowl. Painted Bright Yellow

Beautifully finished with a 12" [redacted]ord for [redacted] a [redacted] type (foam or built-up) =1 built-in bulkhead. Firewall drilled to [redacted] steerable [redacted] and [redacted]

ALL-TRANSISTOR MICON TRANSMITTER $19.95

[redacted] with [redacted] tone receiver. All [redacted], crystal controlled unit comes with telescopic [redacted]. [redacted] 8 oz. Size: 4 11/16 x 2 11/16 x 1 5/16.

For miniature cars, boats, planes. Has printed [redacted] battery [redacted] switches [redacted] for easy [redacted]. 3 1/8 x 1 7/16 x 7/8.

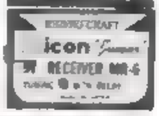


"ELF" ALL [redacted] RECEIVER $11.95

ALL-TRANSISTOR "JR" T[redacted]

[redacted] circuitry and [redacted] "center loaded" telescopic antenna guarantees [redacted] [redacted]. Feather-[redacted] micro-switch [redacted] signal [redacted] easy, positive. [redacted] less than 2 oz. w/case

Prewiring, selected [redacted] guarantee reliable operation under [redacted] conditions. [redacted] connecting [redacted] tuning wand included. Wgt. 2 oz.



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All items can be used with Aristo's Ruddervator [redacted] Codematic units. All conform to latest [redacted]

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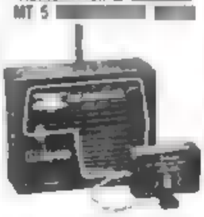
[redacted] SUPERHET TRANSMITTER [redacted] MT 5 [redacted]



Space engineered for maximum [redacted] and [redacted] range. Designed to operate on nickel cadmium or standard battery supply. Deep [redacted] printed circuit and [redacted] quality [redacted] this a most reliable ground control unit. Hand-held, complete with chrome plated central loaded antenna. Meets all FCC regulations. Transmitter size: 4¾ x 5⅞ x 2¼. Instructions included.

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BOTH FOR $29.98 ATTACHES EASILY TO ANY TYPE TRANSMITTER

[redacted] Ruddervator & Code-A-Matic give 6 channel multi on single channel operation, unfailing pilot reaction, no missed signals due to [redacted] hand on button keying switch.

[redacted] single [redacted] der and elevator servo powered by low drain motor and is self-neutralizing. 1¼ high, 4 [redacted].

CODE-A-MATIC has [redacted]" control stick and separate "[redacted]" button. Energized [redacted]omatically, also self-neutralizing. Transmits [redacted] with accurate precision.

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For Elevator [redacted] Fuselage with narrow cross-[redacted]tions. Glider [redacted] Your Imagination 30" 95¢ / [redacted]

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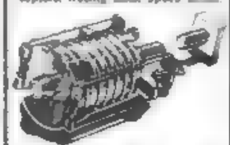
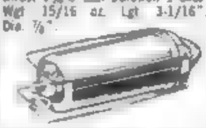
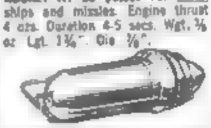


SCORPION 600 $4.00. For [redacted] Engine thrust 4 ozs. Duration 7-9 [redacted]. 1-9/16 ozs. [redacted] 2¼". [redacted] 1¼"

PAY-LOADER [redacted] $2.00. Engine thrust 1¾-8 [redacted]. Duration 8 secs. Wgt. 15/16 oz. Lgt. 3-1/16". Dia. ⅞".



ROCKET HT 50 $1.50. For [redacted] ships and missiles. Engine thrust 4 ozs. Duration 4-5 secs. Wgt. ⅜ oz. Lgt. 1¾". Dia. ⅜".



[redacted] HELL-CAT $1.00. Engine thrust ⅜-⅜ oz. Duration 14 secs. Wgt. 5/16 oz. Lgt. 1⅞". Dia. ¾.

ENGINE AUGMENTER TUBES to [redacted] thrust:

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JETEX [redacted]

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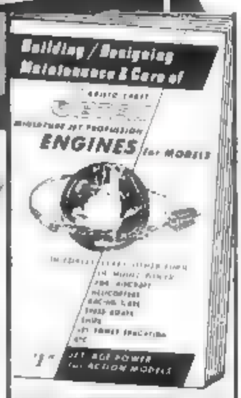

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DEPT. AM-38

SEND CHECK or M.O.
NO C.O.D.'s PLEASE . . .
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ALL ITEMS PPD.

"new-construction" models, procured since 1959, will weather the years with virtually no deterioration. There are hazards even in [illegible] museum — dust, dirt, sunlight, excessive dryness. (For maximum life, models should "live" in [illegible] uncomfortable, controlled humidity of 40 to [illegible] percent — enough to cause a cascade of water vapor [illegible] windows during a cold day.)

Everyone anticipates his own private millenium, and the Smithsonian staff is no exception. Theirs is the construction of the [illegible] Air Museum building — separate, distinct and dedicated [illegible] history and high points of the aero-space age. Pending final Congressional appropriation, Mr. Casey and his staff face frustrating daily decisions of what to display and what to keep in storage. The bulk of their fabulous collection must stay hidden from view. Of [illegible] full-scale aircraft, ranging from a Fokker [illegible] to a B29, only 16 are on display, the remainder being stored at a warehouse in Silver Hill, Maryland.

For a model builder the problem is even more tantalizing. A warehouse in downtown Washington contains almost two-thirds of the 1:16 scale and three-quarters of the 1:48 scale collection. Walk through the door, prepare for a happy but frustrating shock. Row upon row of shipping containers, are stacked head high, each labeled with the name of the model stored therein: Boeing P26, Lockheed Orion, Gotha, F104. On and on — filling a huge room, all stored in neat boxes only to be seen with great difficulty. It is easy to imagine the agony the staff experiences when any model is consigned to this limbo.

Present conditions notwithstanding, Lewis Casey continues to collect the best from American modelers, displaying what and when he can, looking forward to the day when all of the monumental collection, both full-scale and model, can be seen and enjoyed by the public.

Sperry Messenger

Continued from page 19

multi, depending on the power you use. The original, shown in the photos, was built by Evan Roberts, and was powered by the new Enya .45. This engine is quite powerful for its size, and with a 11 x 6 Tornado nylon prop, and Idle-X fuel, it turned up [illegible] rpm right out of the box, with no break-in, which results in the Messenger rolling the entire distance of 7 to 8' on take-off, after which it climbs out at 45 to 50 degrees at full power. With the Enya continuing at full throttle, it flies like a jet. Rolls, with ailerons on both wings working, are like corkscrews. But with Enya throttled back to about half power, it tames down into [illegible] relatively easy-flying airplane with more scale-like speeds. At half-power, [illegible] still does beautiful rolls. Actually, any good .35 would be very adequate power for this ship, and the O.S. Max S-35 would be an ideal choice.

Wings: Rib-spacing is scale. In order to preserve the scale appearance of the fabric covered wings, I have kept sheeting on the wings to [illegible] minimum consistent with ruggedness. I felt that this called for spruce spars. Start the wings by building both front and rear spars for both wings, joining the separate pieces at the proper dihedral angles with the spruce doublers, and cementing them with either white glue or epoxy. While these are drying, you can make a building jig for the wings out of a few pieces of Celotex, Homasote, or similar material. Cut a piece to the proper width for the center section, and tack this down to a building board. You [illegible] attach pieces to either side of this, angling them upward to

form the proper dihedral angle.

Each wing is then built in one piece by cutting out all ribs and slipping them over the front and rear spars, sliding them into approximate position. After you have completed this step, lay the wing plan over the building jig, and place the wing assembly over it. Carefully align each rib into its proper position, and pin to the spars. You can keep the wing flat, in warp-free alignment, by blocking up the spars and pinning them to the building board. Then glue all ribs in position. Check the alignment of the trailing edges of the ribs, and block them up if necessary. Next, glue the trailing edge pieces in position; then add the leading edges with the front dihedral braces. Fill in over the front spar between all ribs with scraps of ⅛" sheet, and sand flush with the tops of the ribs. This provides a surface for gluing the leading edge sheeting in place, and helps lock the entire leading edge assembly, sheeting, and spars into a D-tube when the wing is completed with the lower sheeting in place.

After all of this has dried properly, add the leading edge sheeting. Box-off the aileron areas with pieces of ⅛" sheet and soft ¼" square filler strips between the ribs. Add the ⅛" sheet piece at the trailing edge of the center section, the angled trailing edge ribs with their 1/16" sheet caps, and sheet the center section. Both wings are identical, except when building the lower wing, be sure to install the wing strut attachment parts before adding the leading edge sheeting, and box-off the servo mounting area before sheeting the center section.

When the wing assembly is thoroughly dry, remove it from the building board and turn it over. Add the ⅛" sheet filler strips over the front spar, between the ribs; then add the leading edge sheeting. When completing the top wing, install the strut at-

tachment parts before installing the leading edge sheeting. Complete each wing assembly by adding the trailing edge sheeting, center-section sheeting, cap strips over the angled center-section trailing edge ribs, and the ¼" sheet wing tips. Carve the leading edge to approximate cross-section, and sand the entire wing assembly to final shape. Notice that the lower wing has a slotted hardwood block installed in the lower surface, to [illegible] the upper [illegible] of the landing gear strut. The lower wing will also require the addition of the aileron bellcrank mounts, bellcranks and pushrods, and part W5-B, with the [illegible] strip of sheeting which become slotted for pushrod clearance.

Ailerons are simple, and [illegible] be built over the plans with [illegible] difficulty. Be sure to construct two right-hand, and two left-hand units. Add the micarta tie-rod horns to both upper and lower ailerons, and the control-horns to the lower units. Be sure the tie-rod horns are located properly.

Tail assembly: Stab ribs are cut from piece of ⅛ x ½", and slotted to receive the spar. Pin the stab trailing edge in position; glue and pin all ribs in position. Align the two center ribs to provide [illegible] snug fit for installing the ¼" sheet fin. Glue the leading edge in place, then cut and glue the tip parts [illegible] place [illegible] one end. Slide the spar through the slots in all of the ribs, sliding the false ribs [illegible] the spar [illegible] you push the spar through. Glue the spar to ribs and the tip; then add the tip parts on the remaining end. Nose ribs should [illegible] be positioned properly and glued. When the assembly is dry, [illegible] it, add the center section sheeting, and sand to shape.

Elevators are built by pinning the trailing edges in place [illegible] the plans, adding the ribs, leading edge, and finally the tip parts. When dry, [illegible] from the board and add the filler blocks at the center for receiving the connecting yoke and the control horn. Sand to shape when dry; add the wire connecting yoke, control horn, and hinges.

Fin and rudder are cut from ¼" sheet and sanded to shape. The fin is installed in the stab after the stab has been silked.

Fuselage: Cut two sides from ⅛" sheet, and mark the position on the inside rear faces for mounting the ⅛ x ¼" uprights. Cut the doubler parts from 3/32" sheet. There are three pieces [illegible] the doubler for each side. Note that they [illegible] spaced 3/32" apart, forming slots for later installation of the cabane struts for the wing. Glue these doubler parts [illegible] place with Hobbypoxy No. 2. While drying, bend the cabane strut parts from 3/32" wire [illegible] shown. Bend the wing saddle pieces from ⅛" wide. Assemble each unit by binding with fine copper wire, laying the struts over the plans to check for proper alignment. When satisfied with their alignment, solder them together.

Next make the 1/16" plywood parts that anchor the bottom of the cabane struts to the fuselage sides. Set these aside, and cut the fuselage triplers from 3/32" sheet. The triplers and cabane struts [illegible] assembled to the sides together. Lay the cabane assembly in position in the slots in the doubler; and glue the tripler over it, using Hobbypoxy No. 2. Lay the entire assembly over the plan immediately after gluing to make certain that the cabane is positioned to assure the correct angle of attack for the upper wing. Slide it up or down in the slots [illegible] necessary. When satisfied that [illegible] is in proper alignment, pin the tripler in place; glue the 1/16" ply retaining pieces over the bent ends of the cabane, at the bottoms. These lock the struts into permanent alignment.

Cut former 1 from 3/16" ply, and former 2 from ⅛" ply. Mark the position of former

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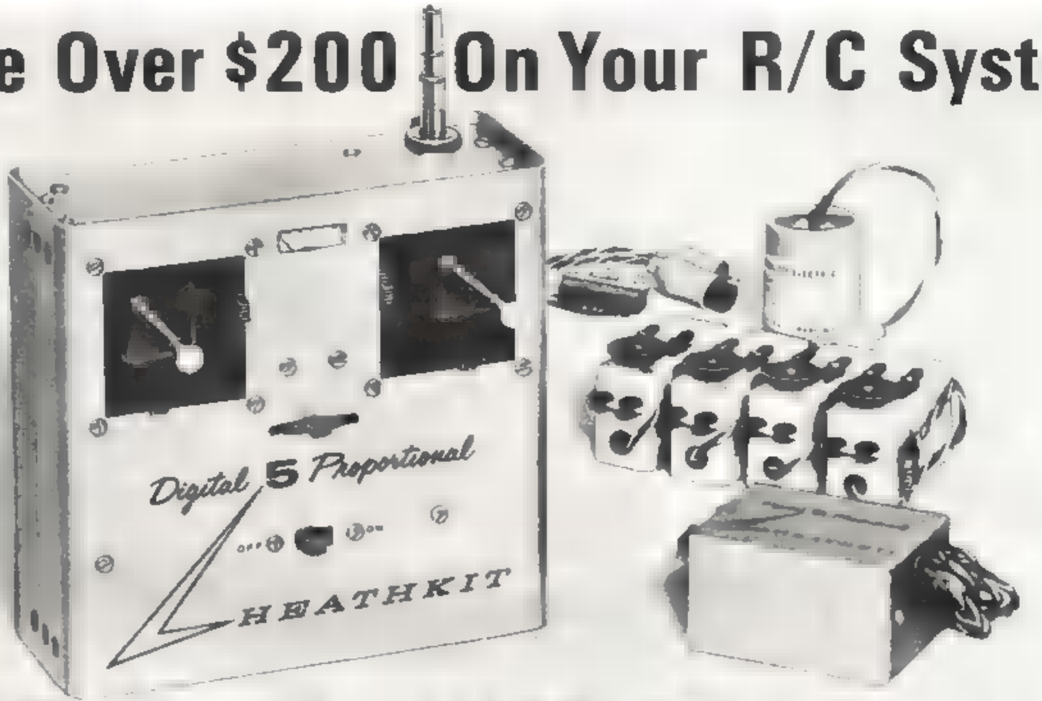

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■ on the sides; glue ⅛ ■ ¼" uprights to the sides at this position. Add the remainder of the ⅛ x ¼" uprights to the sides at this time. Cut all remaining formers from sheet balsa as indicated, and cut a piece of ⅛" sheet to triangular cross-section to form the tail post.

To assemble the fuselage sides, pin one down to your building board, making certain that it is flat. Glue former ■ and 2 in position, checking with ■ small square to make certain they are aligned properly. When solidly dry, glue the other side in position, while the assembly is still pinned to the board. Check again for proper alignment. Use white glue or epoxy for this operation. Whey dry, remove from the board and add the top and bottom parts of former 3. Then pull together ■ the rear, and glue the tail post in position. Add each top former in proper position ▬ shown, and add the bottom cross pieces of ⅛ x ½". At the trailing edge of the lower wing, the fuselage ▬ pieces — top and bottom — are ⅛ ■ ¾".

Install the cockpit floor of ⅛" sheet and the former ▬ the instrument panel. Plank the entire top of the fuselage from the instrument panel back with soft ⅛" sheet, ▬ ⅛ x ¼" strips. Cut out the sheet covering to form the cockpit coaming. Install the tail-skid and tail-skid mounting parts, and ▬ the bottom of the fuselage with ⅛" sheet. Notice that the very front end of the bottom sheeting is laminated from 1/32 and 1/16" sheet, and hinged with a strip of nylon ▬ provide ▬ to servo pushrod connections.

Make the motor mounts by epoxying two pieces of 5/16 x ½" hardwood together to form each, ▬ shown. Glue these in position in formers 1 and 2 with epoxy. Add the ¼ x ¼" triangular gussets ▬ the rear face of former 1, and box-off the tank compartment with ⅛" sheet. ■ you wish, you can fuel-proof the tank compartment with a few coats of fibreglass resin.

Cut a hardwood block to the proper size, as shown, ▬ provide for attachment of the front of the landing gear struts; drill it to receive the wire struts. Then glue it in place, anchoring it in the plywood strut retainers. Epoxy would be desirable. When this detail is completed, you can add the top and bottom cowl blocks to the fuselage, and the three blocks that form the nose. Rough-carve these ▬ approximate shape, then sand the front flat to provide firm gluing surface for the plywood ▬ ring. Make this ring from 3/16" ply, as shown. You can make it in one piece, or cut the top part away ▬ form ■ U-shaped ring, which will make installation of the engine easier. Glue this in place with epoxy. When the entire assembly is dry, ▬ and sand the entire fuselage to final shape. Add the aluminum oil drain tube, the 1/16" plywood strengtheners for the rear hold-down dowel, and the fairing pieces on the cabane struts, and your fuselage is finished. Fuel-proof the nose, inside and out, with a few coats of fibreglass resin.

Check the ▬ of the lower wing into the fuselage opening, sanding it if necessary, so that it slips easily into place. When satisfied with the fit, add the small fairing block at the leading edge.

Wing and landing gear struts: Make a pair of N-shaped interplane struts from 3/16 x ½" spruce. Epoxy the parts together. You can make these from pine, basswood, ▬ very hard balsa, if you wish. Bend the wire attachment parts to shape, and epoxy them in position and reinforce with small strips of nylon. When making these wire parts, grind the ends of them off to a radius ▬ that they will slip easily into the tubing on the wing. It will also help if you anneal the wire before bending them, to render it soft and easily workable. To anneal, simply stick ■ length of 3/32" wire into ■ gas flame, holding it with pliers, and heat until it's cherry red. Remove it from the flame, and let it cool in the air. When the red glow has disappeared, you can lay it down on ■ suitable fireproof surface, such ▬ the concrete floor, until it cools enough to handle. Do not quench it in oil or water, but let it cool naturally, in the air. When you are able to handle it, you'll find that it bends very easily. These strut attachment parts ▬ not load-carrying, so the wire can be soft with ▬ problems resulting.

Bend the main landing gear from ⅛" steel wire to the shape shown. This will require some care ▬ your part, as it has a number of bends. But by taking extra care as you proceed, you should be able to form this with little difficulty. Form the two shock cord retainers from 1/32" wire and bind to the bottom of the struts with fine copper wire. Next, shape the strut retainers from 1/32" sheet brass, and slot each as shown. Solder these in place on the bottom of the strut. Cut ■ piece of ⅛" wire to proper length for the axle, and set it aside.

Turn the fuselage upside down and fit the lower wing into position. Take the landing gear you have just completed, spread the front part slightly to slip the ends into the drilled hardwood block installed in the fuselage, and slip the rear part into the slotted block in the lower surface of the wing. Slip a few rubber bands over the wing to hold in position. This will also secure the landing gear in position. Cut and shape the landing gear fairing pieces from spruce or hard balsa. Epoxy to the struts, but make sure you do not glue these to either the fuselage or the wing. When dry, ▬ the landing gear and the wing from the fuselage.

Covering and finishing: The prototypes were fabric-covered, and doped the Army khaki-brown color, all over. They were not pretty, nor were they noted for any hand-rubbed finishes. Therefore, to achieve a scale-like finish, you simply dispense with all of the filler coats, wet-sanding, and hand-rubbing. Start by giving the entire structure two coats of clear butyrate, sanding with very fine sandpaper between coats; then silk the entire ship. Apply three or four coats of clear dope to the silk, until the weave begins to fill in. Glue the tail assembly in position at this time.

Add any additional coats of clear dope that may be necessary until the silk is filled in, and the dope ▬ longer goes through to the inside. Sand lightly between coats with No. 400 sandpaper to remove the fuzz that rises ▬ the silk. When you have enough clear dope ▬ the ship, spray or brush on the required number of coats of colored dope. Since there is no khaki-brown dope available, Aero Gloss olive drab was used on the original, and only three coats were necessary. Add the stars, the red, white, and blue bars on the rudder, the lettering on the rudder, and the numbers on the side of the fuselage, and you're finished. Lettering on the rudder can be made from small decals, while the numbers on the fuselage can be cut from decal sheet, or masked off with ¼-inch masking tape and doped on with black dope.

Assembly and flying: All that remains is to install your equipment in the ship, put it together, and you're ready to test-fly. To assemble, place the bottom wing in place, then slip the front of the landing gear struts into the block in the fuselage. Apply rubber bands over the bottom wing to hold it in position, which locks the rear of the landing gear strut into the slotted hardwood block in the lower surface of the wing. Slip the ⅛" wire axle through the slots in the bottom of the struts, and bind

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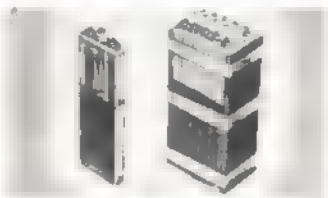

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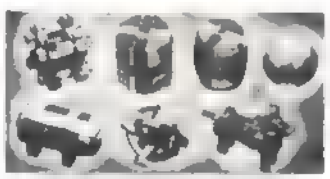

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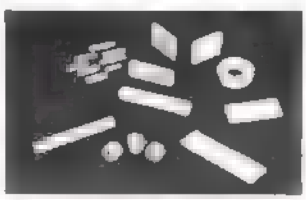

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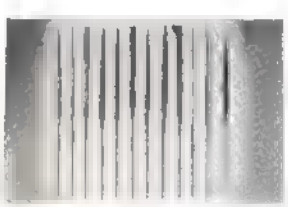

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with small rubber bands to retain in position. Do not bind too tightly, but just snugly enough to retain in place. If you bind this too tightly, you will lose the shock absorbing action. Install the wheels, locating them in proper position, and retaining with a pair of Du-Bro collars on each side of the wheel. Place the wing in position on the cabane, and temporarily hold in place with one rubber band over each strut. Install the interplane struts, shifting the top wing slightly if necessary, to bring everything into proper alignment. Now install the pushrods that connect each pair of ailerons; the Kwik-Link at the end of each will enable you to make fine adjustments for proper alignment.

Before flying, be sure your ship balances at the proper center of gravity position, and that all decalage checks out according to plans. If you have somehow acquired some positive decalage during completion, get rid of it by changing the angle of attack of the stabilizer. With the short-coupling, and the small horizontal tail area, this ship will climb like a homesick angel. You'll have to apply considerable down trim to level it out, if your decalage is off on the positive side.

Although the plans show the installation of reed equipment, by the time the original model was finished by Evan Roberts, most of the members of our flying group had acquired proportional. It was flown on proportional. It flew quite well, right off the drawing board, and initial flights were in very windy weather, which didn't seem to bother the ship. From every standpoint it is a most satisfactory flyer.

Specter

Continued from page 22

the crutch, and slide it into place. Round off the front of the leading edge and slip it into the crutch. Glue the center to the crutch. Insert the trailing edge and glue the center to the crutch. Make sure both the leading edge and trailing edge are at right angles to the crutch. While the glue on the leading and trailing edges is still wet, pin the center ribs in place and glue. Glue the tip ribs and front part of the center ribs to the top of the wing.

Glue the joints between the leading edge and tube and all other nylon to wood joints, using a contact cement such as Weldwood. Seal off the ends of the tubes well, so that fuel won't work its way into the wing. While the wing is drying, sand and assemble the elevator and stab. When the joints on the wing have dried, glue the wingtips, tip braces, and gussets in the wing. Glue the front part of the center ribs on the bottom of the wing. When the glue has dried, insert the bellcrank in the crutch and place a few washers on each side of it to the bolt so that it won't slide up or down.

Glue the $\frac{1}{16}$" planking on the bottom center of the wing. Install the pushrod and leadouts. Limit the elevator movement to about 20 to 25 degrees in each direction. This may not seem like much for a model with a conventional stab; but experimenting has proved that this is all you need. When you have adjusted your elevator movement, plank the top center of the wing.

Glue on the booms, and slide the stab into place. Line-up the stab with the wing, and glue in place. Glue the lead-out guides in place and put a $\frac{1}{2}$ oz. weight in the outboard wing tip if you wish. I don't use weight since the engine and fuel are on the outside centerline of the plane.

Plank over the booms and drill out the holes for the engine mounting bolts. Install the blind mounting nuts and glue on the

nacelle. For a more streamlined model, you can fill [redacted] the section around the engine shaft with scrap balsa.

Sand the entire model with fine sandpaper and cover the wing. I strongly recomend using silk on the wing, since it increases the strength of the model. Silkspan may tear during flight because of [redacted] slight vibration caused by the air going over the wing. If the plane is covered with Silkspan and is flown with a small [redacted] or hole in the covering, the Silkspan will probably tear off within seconds after the launch. I had this experience on my second model. Holes in the silk covering should be patched as soon as possible, but the silk will stay on the plane during flight if they are not. The silk would be more durable anyway.

Finish the model [redacted] you desire. However, go easy on the colored dope in order to keep weight down. Mount the engine and check to see if the model is balanced properly. Flyers with very little experience, should balance the plane about ¼" forward of the point shown on the plans. If the model is a little nose-heavy, doping the tail section will bring the balance point back. Finish neat and smooth.

Finish That Counts

Continued from page 27

Painting instructions: Lower wing, bottom of fuselage and elevators [redacted] sprayed light blue. With an easy motion, spray bottom of wing from right to left, and then bottom of fuselage and elevators. Use medium spray, being careful not to get any runs, and after thoroughly dry, sand [redacted] rough spots lightly with No. 600 wet [redacted] dry. Spray once again, adding [redacted] little [redacted] thinner to the light blue. When light blue is dry, mask off wingtips, undersurface of

cowling, and fuselage band, and spray white. After white is dry, mask entirely all parts painted white so that no paint from the next coat will penetrate the white areas. Spray top of wing, canopy, elevators, and fuselage one-third up from bottom, with light gray. After light gray is dry, touch up any rough spots with No. 600 wet or dry. Spray again, sanding smooth after each application.

Now to apply the mottle, using medium gray paint, spray in random pattern, checking three-quarter front and three-quarter rear photos of model. After mottle is sprayed to your satisfaction, remove masking tapes off all of the white surfaces. Spray propeller white; mask off white area on spinner and spray blades flat black. The little adjustment bands on each blade are painted flat aluminum with a good No. 00 brush.

The F. W. 190 model was sprayed with a Badger No. 200 Air Brush and Compresser. If you are interested in advancing your paint skills, send for Badger's Spray Painting Handbook.

Straight and Level

Continued from page 6

rented or made — PA systems, telephone lines, equipment, barriers, signs, painting circles, etc. Income considered, AMA still loses several thousands of dollars on the Nats each year.

Navy looks to AMA and HIAA to provide more support. What does AMA supply? Here's the list: 1) Contest director, event directors, and assistant directors; 2) Insurance coverage for contestants and events; 3) Instruction of Navy personnel in registration, judging, tabulation, timing, etc.; 4) Publicity support; 5) Selected items of equipment.

What does HIAA supply? 1) Trophies (and AMA sweats blood to extract these trophies at considerable expense to itself, and with inconsistent results); 2) Sun helmets for event personnel; 3) Financial support for the Junior winners carrier cruise after the meet; 4) Publicity. Financially, HIAA [illegible] an organization, appears to suffer no inordinate strain thus far.

Significantly, Navy calls attention to the fact that HIAA had, until five years ago (but not for many years, in actuality) a National Air Youth Competition, which was superimposed on the Nats. Regional competitions produced state champions, who then competed at the Nats for Air Youth National Champion.

"This competition resulted in great Navy and news media interest," states Navy. Well, where is this valuable Air Youth program today? Dead for lack of financial support. People like Charlie Miller of Testor, Art Laneau, and Nat Polk — Nat [illegible] than any individual — made it go with their personal drive. But there is a limit to this sort of thing. If this program worked before, what is HIAA and AMA going to do about reviving it? The question demands an answer.

Navy, at least, has recommendations. They [illegible] willing to go on — provided! Of AMA and HIAA they want registration teams, tabulation teams, trophy detail personnel, processors, clerical personnel, janitorial service for contestant work areas. They want [illegible] return to the original objectives of 1948.

That AMA and HIAA institute measures [illegible] encourage and increase a larger percentage of youthful contestants; including reestablishment of an air youth regional and national competition by the 1969 meet; scholarship award programs for winners in Junior competitions, waiver of registra-

tion fee for elementary and high school students, with an accompanying sponsored publicity program in the nations schools; sponsored Boy Scout and Girl Scout model airplane flying clubs with regional competitions for Scouts only; sponsored model flying clubs aboard Navy facilities available to Naval and Marine personnel and their dependents. Navy also lists their own necessary contributions, which don't apply here.

As to the length and size of the Nats, flying should be limited to five days, thinks Navy, Wednesday through Sunday. The absolutely unavoidable requirements, if we are to have Navy-hosted Nationals, are personnel assistance from AMA and HIAA; and that the percentage of youthful contestants be markedly increased by 1969.

These problems could, and must be solved. We believe that AMA has a fighting chance to meet its requirements. Unfortunately, the greater requirements — in that someone must raise significant funds — fall on industry. But the industry is incredibly disorganized. They lack member-to-member dialogue. HIAA spends large monies to fight glue-sniffing legislation. Will they support the modeler himself?

Numerous radio-control manufacturers have no interest in HIAA. They don't need HIAA they say. They don't even exhibit at the Annual Trade Show. Numerous dealers don't belong to HIAA. What is left is old-time firms, such as Top Flite, Sterling — and how many can you name? — who, also in radio, still maintain a broad base. There are not enough of them. The radio people have their own association — but contribute little or nothing to sustain the whole hobby, even though their own futures are tied to a life-cycle of interesting youthful beginners in model aviation.

Navy support cannot be defaulted. Nothing comparable will replace it. The Plymouth Internationals are long since gone. Also, the Air Youth program. Must Navy be added to the list? AMA is moving on these problems. But we cannot rest content on hard-core, middle-aged, specialist hobbyists. Because we do, the hobby is sick. The Navy problem is both a symptom, and a challenge.

There is lastly the unrational belief that model building should automatically be supported by space-age industry, etc., in short, by "they." Why? We always argue that model airplanes are good for kids, offset deliquency, teach skills, etc. So someone underwrites a meet only to discover that the modelers are old as their own executives. This is always the problem. The older modeler, who once was a kid who did benefit (and wants it to go on) from various sponsorships, keeps a stranglehold on the competition picture. The reasons one hears why this or that cannot be done, are fantastically cockeyed.

No one wants to leave out the Open-class modeler. In fact, Navy wants him, too. The "champ" adds color, and inspires the youngsters. If 20% of the Nats entries were Open Class, Navy could justify support. But at the last Nats, 57% of the entries were in the age bracket 30 to 79. Yes, they ran that old. Seventeen percent were 21 to 39, and only 26% five to 20. In this bracket, relatively few were in the Junior classification. Fifty-nine were 12 or under; 139, including these, 15 or under.

We are lucky to have a 1968 Nats. If we have one in 1969 it probably will be due to a thing called the Delta Dart.

Radio Control World

Continued from page 34

form a Hemholtz resonator to break up the sound waves. The dimensions given were found best for a ST 35 and no other engine was tried. Unit could be scaled up a bit for larger mills.

The four tubes are silver-soldered to the forward separator, and are a close [illegible] in the rear one. Surprisingly, Ron says he found epoxy could be used for these joints, and that it holds up well under engine heat. He also feels the exhaust extension does not need to be too snug a fit on the engine exhaust stack. Power loss for this muffler was 11½%, lowest of any that were tried. All gave about the same noise reductions, but the one shown seemed superior in cutting sounds most irritating to the human ear. The Supertigre muffler was found best of commercial units, with Spinaflow next.

Unusual car control: For the amazement of family and visitors, Tim Brown (8715 Glenloch, Houston, Tex. 77017) fitted [illegible] rather unusual control system into a model Mustang car. It's based upon an old pulse rate-pulse width system he had, but differs from ordinary practice in that the unfiltered output of the pulse rate circuitry is utilized to allow variable speed for the drive motor. Rate range is about 2½-1 and maximum rate produces steady on, for full motor speed. The trimmable motor control servo from the old system moves only about ⅛" — just enough to trigger DPDT switching to reverse the drive motor.

Pulse width is utilized in the normal manner for steering, and isn't shown on [illegible] circuit. Q4,Q5 are a flip-flop connected in parallel with the pulse width servo; purpose is to defeat the rate switcher, so that the car may be stopped. Just a punch of the MC button (either fast or slow) takes care of start-stop. The MC servo is normally at one extreme [illegible] the other, so you can start or stop the [illegible] repeatedly by pushing the right button, and without changing direction. This servo movement is restricted by masking off part of the servo switcher board with electrical tape.

The receiver had the filters removed from the pulse rate output; [illegible] wire is brought out from the POD circuit to connect to the two .2 mf capacitors [illegible] lower left. The various −2.4 and −2.4V leads [illegible] the circuit go to appropriate batteries at lower left. Drive-motor battery voltage is not shown, may be anything needed. Q1 may be any germanium [illegible] Silicon transistor. Q2 must be able [illegible] carry 200 ma. [illegible] more; the 2N1304 works fine. Q3 should be a medium power job, capable of handling as much as 3A and perhaps 20 watts. We noted at last moment that resistor from base of this transistor to +2.4V was omitted; it's 220 ohms. Overall circuitry may be somewhat simplified by omitting the flip-flop (Q4, Q5); stop is then obtained by holding an MC button on the transmitter depressed. All diodes in original circuit were silicon; all those marked "D" could be germanium, however.

Solderers beware! A warning in recent issue of the NMPRA News should be heeded by all modelers. Seems that Lt. Jan Sakert, an expert multi-flyer who was stationed for some time at the Marine base near Los Angeles, and transferred last year to Hawaii, was converting a gallon glow fuel can to use with an electric pump. [illegible] had filled the empty can with water and emptied it, then filled it about two-thirds full and started soldering with a butane torch. Evidently there [illegible] fuel fumes left in the can, for it exploded violently just [illegible] he was about finished. He suffered second and third degree burns [illegible] his neck, body and arms (fortunately the blast missed his face and eyes), was in the hospital for several weeks in intense pain. Before applying [illegible] flame to any fuel tank or can, it should first be washed out thoroughly with hot water and liquid dishwasher detergent to remove *all traces* of oil and methanol. We sincerely hope, along with Editor Harry Boronian of the Hawaii RC Club, that Jan will be in fine shape again and actively back at RC by the time this appears in print.

Better throttle link: Engine vibration rattles the little link used to connect intake and exhaust throttles so much that the holes in which the link fits soon become oversize. Can also cause noise in some RC systems. M. J. Dietrich (9690 Beaverton Hwy., Beaverton, Ore. 97005) found a cure. He bent [illegible] link from 1/32" dia. music wire (the original was 1/16" wire) after sliding on a length of small diameter Teflon tubing. The holes were drilled out for a smooth fit over the Teflon (which is just a bit over 1/16" dia.) and [illegible] trouble has come from this source since.

Red Sea patrol reports: Occasional member of a group of diehard RCers who fly at 6 a.m. every Friday morning (the early hour is to escape the breeze that later comes off the Red Sea, and Friday is a Moslem holiday), James Kasson (c/o Wilson-Murrow Inc., Box 1480, Jeddah, Saudi Arabia) writes that they have 364⅞ sunny days a year, a huge airfield, no interference, no crowded flight lines for models, which might sound like RC utopia. Drawbacks are no supplies, 40% Customs charges, terrific airmail postage [illegible]ts.

It's a "dry" country in more ways than one, and even methanol is prohibited. It might tempt the unknowing! The modelers found that Convairs use meth in water-injection systems; they also found that castor oil costs 60c for [illegible] two [illegible] bottle (only size available). Even so, a fair group of RCers is active, including several Wilson-Murrow [illegible] (and the daughter of one of them) plus pilots and other personnel of Saudi Airlines. Planes sound like any U. S. model field — Aeromaster, various sizes of the Falcon, Tauri, Skylane, etc. Equipment equally varied but more and more multi propo is going into use.

P-38J: "Ace-Maker"

Continued from page 48

(apple green). The colors were mixed using U. S. Camouflage World War II Booklet (see "Mail Bag", page 54, Dec. '67). There are firms who make ready-mixed paint, but truthfully it is [illegible] big adventure to mix your own. It isn't a mysterious rite; when you become a little accustomed to mixing your own, it will seem a simple task.

Assembly and painting: After major parts are assembled, spray entire plane with primer coat, except small parts. Sand and fill areas where joints are not snug. After putty is dry, use wet and dry to sand into smooth contour. Spray entire plane again, using undersurface color, applying at least three coats. Sand smooth between each application. It is a good idea to thin your paint with a small amount of thinner after the second coat. When the undersurface is to your satisfaction, cut masking tape as per kit drawing, and press well around all camouflage separation lines. Spray uppersurfaces with at least two coats of olive drab, sanding between first and second coats. Install small parts as per kit instructions. Use only the minimum of cement [illegible] it will destroy your finish.

The model is ready for the application of decals. A word of caution: trim decals as close to color outline as possible. If you wish to have a flat finish, you can spray

entire plane and decals (when thoroughly dry) with Dullcote. Then cement the canopy in place. Your ace-maker is now ready to add to your collection.

New in RC

Full-sized plans of a Hawker Hunter scale model are offered by **Model Plan Service** (Box 824, Tustin, Calif. 92680). Sleek swept-wing fighter model was designed by Swiss builder Franz Meier, has 57" span, 61" length. Original was flown with Merco 61, weighed 9 lb. Besides full-sized drawings, there are many detail sketches, a separate three-view sheet of the full-size plane, showing Swiss Air Force markings, and instructions in English. Costs $5.50. MPS offers other scale plans of recent planes, some between wars, and WW I jobs, priced from $2-5.50. Send for list. Scale perfectionists may obtain much detail on many of these planes, from the Profile Publications; Profile #4 on the Hunter is included in above price.

Though no prices are known, first new kit plane in 1968 Program of **deBolt Model Eng. Co.** (Buffalo 15, N.Y.) is what they call an "RC Scale" kit of Bell P-39 Airacobra. This means a plane to general outlines of the big job, but modified sufficiently to make a top grade flyer and stunter. Apparently this is the plane Hal deBolt flew through the Pattern competition wars of 1967.

Min-X Radio Inc. (Detroit 4, Mich.) announces a complete propo control system based upon the Rand Dual Pak. Because latter requires much higher pulse rate than normal GG systems, a special modified Pulsmite transmitter is included. This is Model DRT, has internal switching to make available the high pulse range for the Dual-Pak and similar systems, or the more usual lower range needed for GG. The complete system includes Dual-Pak, dual-range transmitter and the SH-1 superhet receiver; the cost is just $179.90. The older Pulsmite transmitters can be converted to Model DRT at the factory for $20. Under development at Min-X is the IC-4 digital propo system, plane equipment of which will weigh 12-14 oz. As name implies, integrated circuits are utilized in all components, and system will list at around $350. Min-X has reduced prices of its digital systems; Astromite VI with four servos now costs $449.95, and Astromite III with three servos is $259.95.

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Products Inc. (Hurst, Texas, 76053) announces their 72 mc propo systems now cost the same as those for other frequencies. For example, Logictrol II five-system with dual stick lists at $450 on 27, 50 or 72 mc.

Official announcement of the new digital propo servo by **Kraft-Hayes Products Inc.** (So. El Monte, Calif.) has reached us. This servo will be furnished with all Kraft propo systems. It uses no variable resistor, as have most such servos up to now (the F&M Magnevac excepted). Since the variable capacitor that takes the place of the resistor cannot get dirty in operation, the biggest of trouble is eliminated. The makers so certain of the trouble-free operation of this component that they offer a five-year guarantee against wear other failure of the capacitor feedback element. The servo is housed in a three-piece plastic case, with mounting lugs for grommets at each end of the center section. On top of the case two push-pull output points (which always move oppositely to each other) and a rotary disc output. Thus there is no worry about mounting a servo "backward" in your model. Case size is .925" wide, 2.54" long (length over grommets is about 3¼") and 1.455" high. Weight is 2½ oz., static thrust is over 3¼ lb. This new servo is Model KPS-9; it is interchangeable with older model KPS-7 servos used on Kraft B and S systems. List price, $39.95.

A dual range transmitter, Model NPT, announced by **Citizen-Ship Radio Corp.** (Indianapolis, Ind. 46220). Internal switch allows high pulse rate range for such systems as Rand Dual-Pak, or low rate for normal GG systems. The transmitter has a built-in nickel-cad charger, wired to plug into Rand Battery Paks. List, $69.95. To go with this transmitter is a modified Model SSH superhet receiver, the mods allowing pulsing at high rates without neutral shift of a pulse width channel. Receiver comes with plug matched to the Rand Paks; $34.95.

Count Down

Continued from page 39

per second). Force is defined by Newton's Second Law of Motion, F = ma. Mass is not the same as weight (see a physics book for the reason). But there is a difference between a kilogram-mass and a kilogram-weight according the following equation: m = W/g, which also comes out W = mg — which is why we get fouled-up in the English system between pounds-mass and pounds-weight. It can still happen in the metric system. But we can't get fouled-up on the units of force in metric because those force units, called *newtons*, are precisely defined by the Second Law of Motion. A force of one newton will accelerate mass of one kilogram at a rate of one meter per second per second. Confused? O.K., let's see what it means; you can dig out the rest of the metric system derivations from your physics books.

We will be measuring the weight of our model rockets in grams-weight — and there are 28.35 grams to the ounce and 453.6 grams to the pound. You can get metric balances just as easy as you get pound-ounce balances. Where you could fly a 2-ounce model rocket in competition before, you can now fly a 60-gram model, which is just shade over 2 ounces. The standard NAR payload has not changed in size or shape; it weighs 28 grams, which is a shade under ounce, and was established as the FAI standard payload because it was also the standard USA payload. We started flying payload events first. Maximum model weight is now grams, half kilogram,

or 1.1 pounds (17.6 ounces), which should make all you big-bird builders jump for joy because you've got an additional 1.6 ounces to play with!

Measurement of length will be in millimeters, centimeters, and meters. There is no trouble converting one to the other because you simply move the decimal point! There are 25.4 millimeters to the inch. An Estes-size engine comes out to be 18 millimeters in diameter and 70 millimeters long. There is likely to be some trouble with body tube diameter sizes for awhile until things settle down, but Model Rocket Industries has already started off with their T-20 body tube that is 20 millimeters O.D. by 19 mm. I.D. An Estes BT-20 is pretty close to being 18 millimeter I.D. and 19 millimeters O.D.

Altitudes and tracking baselines will be in meters. We have a 300-meter tracking baseline, which is 984 feet and a few inches. You can still use a 1000-foot baseline, because the rules require a baseline at least 300 meters long. And you can still compute altitudes in feet and convert them to meters. However, I've already made the shift to metric baselines and altitudes by setting up the 300-meter baseline on the NAR Space Pioneers flying field and recalculating the data reduction tables for the 300-meter baseline. Anybody with a slide rule, a desk calculator, or a computer can do this in less than an hour; I did.

It is likely that we will continue to build scale models with inches and feet as the basic units for some time because all of our primary scale data for USA vehicles is given in inches and decimal parts of an inch. There are too many measurements to convert easily. Flight velocities will be in meters per second instead of feet per second, which will make the numbers somewhat smaller.

It is in the area of propulsion where we will run into the most evident change. Thrust and total impulse will be measured in newtons and newton-seconds respectively. This is not tough to do nor is it difficult to learn to live with. One pound of force or thrust equals 4.46 newtons. An engine with 1.12 pound-seconds of total impulse also has 5.0 newton-seconds of total impulse. This will cause a change in the NAR engine coding, because an A.8-3 becomes and A3-3. There will be some initial confusion because the B.8-4, for example, becomes a B3-4 in the new system; perhaps causing some mix-up between the Series I and Series II engines. But the current B3-5 becomes a B13-5. If in doubt, look at the nozzle, because the Series II engine has a whopping big nozzle. We will get used to this change very rapidly, believe me. Once, the current B3-5 engine was called a B16-5 engine (before we could accurately measure its sledge-hammer thrust), but we had no trouble converting in our minds. The new engine coding contains no decimals. Where we used to say, "A-point-eight-dash-three," we will hereafter say, "A-three-dash-three." Average thrust for coding purposes will be rounded-off to the nearest newton. The newton is a smaller unit of force and much handier.

I have already built a couple of models completely on the metric system using metric rulers. The millimeter is a handy unit for model rocket construction. Its size is just right! It's about a 25th of an inch! It's much easier to remember 31 millimeters instead of $1\frac{15}{64}$ inches.

Grams are likewise handier units for model rocketeers because there are so many of them equivalent to an ounce. A model weighing 1.34 ounces is just a shade over 38 grams, for example. The shade is expressed in decimal parts of a gram. If you really want to get accurate, start measuring in milligrams, which are one one-thousandth of a gram, and most laboratory balances can achieve this kind of accuracy without much sweat.

We will get fouled-up for awhile on areas, because it is more difficult to carry them in your head. This is particularly so when it comes to loadings where we are used to thinking in terms of square-inches per ounce of streamer or parachute areas instead of square centimeters per gram. But the FAI model airplane teams do it for wing-loading measurements; we can do it, too!

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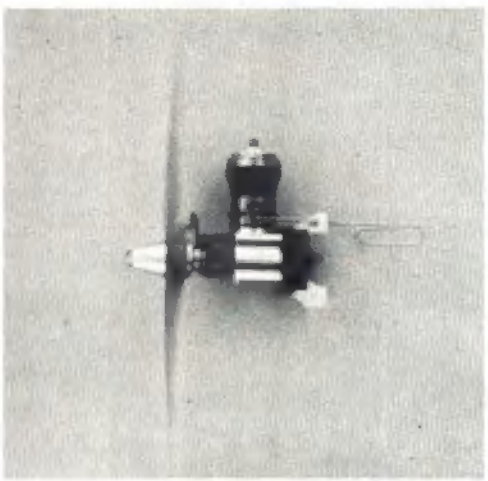

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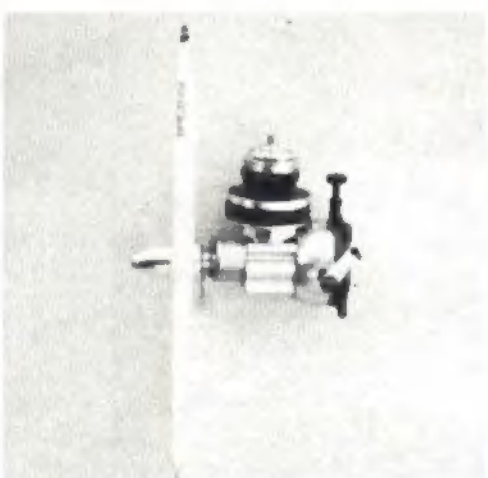

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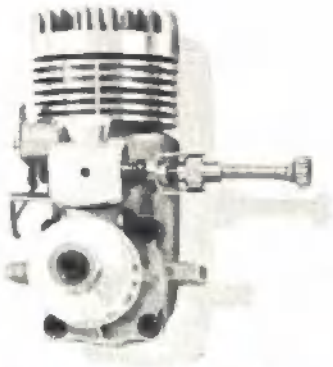

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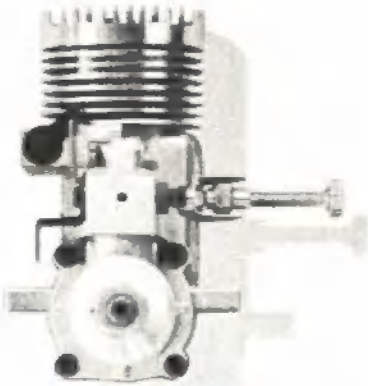

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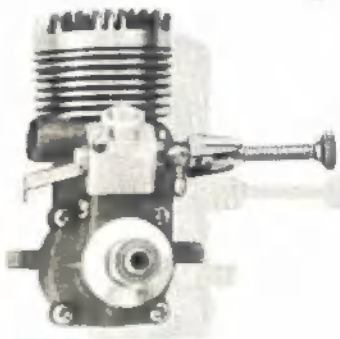

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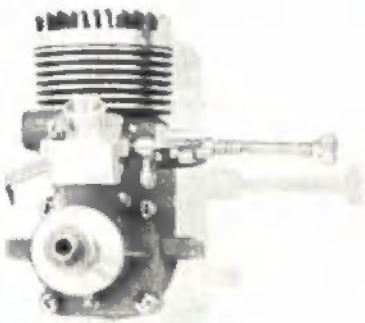

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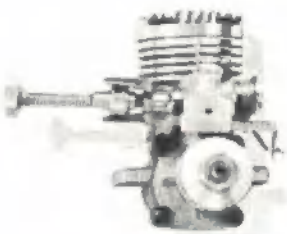

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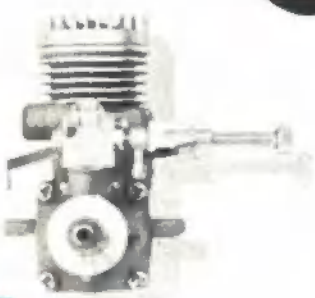

.19IV TV—$15.50
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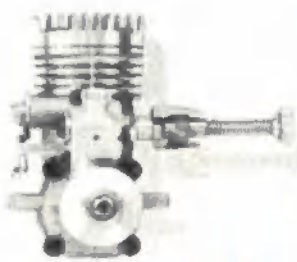

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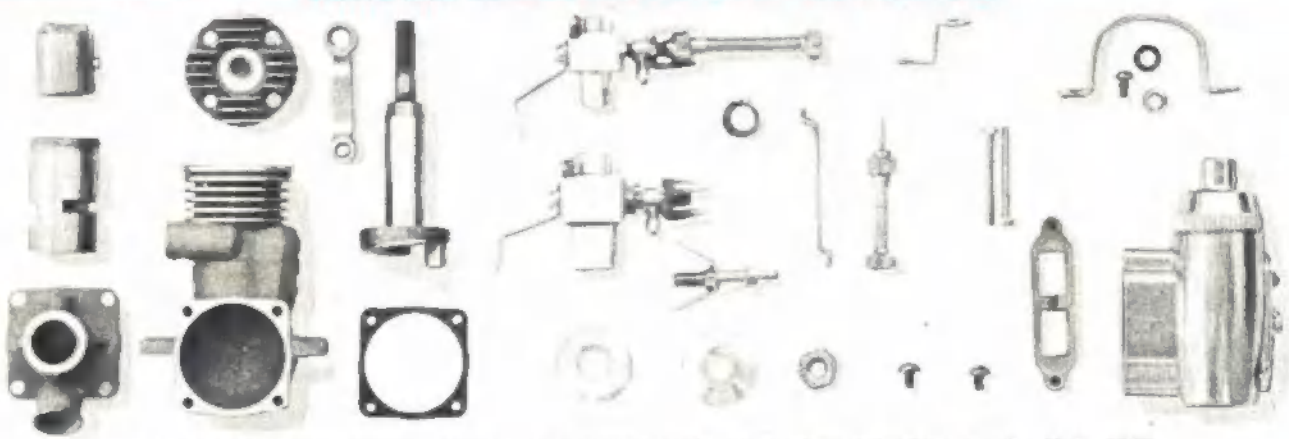

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